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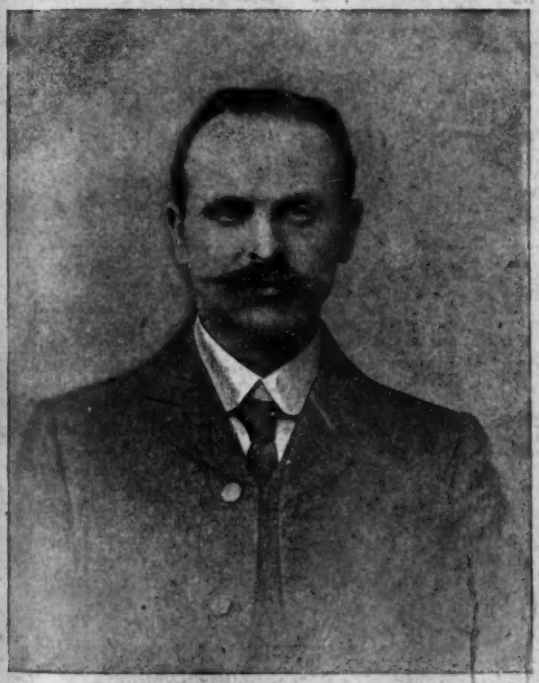

A New Candidate for the Vice-Presidency:
Mr. A. R. PICKLES, B.A.

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A FRENCH SECONDARY SCHOOL.

BY "A SCOT ABROAD."

DIJON, the capital of Burgundy, with its palaces, its ancient houses, its quaint old streets, has many an interest for the student and the passer-by. But old and new jostle each other with strange familiarity, and while we find the old so well preserved—

> "as if the middle age
> Were gorgeous upon earth again"

—there is also the strictly modern atmosphere of the Republic. To treat of but one aspect at a time, the latter may be clearly seen in its educational system, and at a time when the study of education has come upon us with a fervour reminiscent of the Renaissance, it may be interesting to point out some of the characteristics of French education as observed in the Lycée Carnot of this town.

Nothing strikes the investigator so much as the order and the method which are found in matters educational. And for the foreigner nothing can be more fortunate, for to see one primary school or one secondary school is to have seen all. To the Scot or the Englishman, therefore, accustomed to the rough and ready methods of secondary education, the organisation, say, of a French secondary school is something of a revelation.

For secondary education is no mere haphazard organisation fostered, as with us, either by local bodies or private enterprise. It is a government concern; its schools are managed and controlled by the government, and secondary education and the university are in close touch. For example, the Rector of Dijon University—no mere cipher, as his title in our country might imply—is the representative of the government in educational matters in the "department" of the Côte d'Or. All educational institutions—primary schools, secondary schools, university—are under his direct care. He transmits and carries out the orders of the Minister of Instruction, and his word is law. The result is that no energy is wasted (and, it may be added, no money).

As a building, the Lycée Carnot is one of the largest in France. The façade, opening on a characteristic French boulevard, is not pretentious, but sufficiently imposing. On entering, the visitor passes through a vestibule, having on his right the "parloir," beautifully furnished with a bust of the late President Carnot, a decorated fireplace, and ordinary scholastic ornaments in the shape of prize lists. These latter show that, in the "concours généraux," or competitive examinations open to all secondary schools in France, the Lycée Carnot has taken its share of honours. The vestibule leads into a peristyle of classic columns surrounding a court adorned with roses and rhododendrons. There are three large courts in the Lycée, and it is round these that the buildings are grouped, generally three stories high. These consist of classrooms, studies, dining-rooms, dormitories, kitchen, laundry, and other such offices. As the school is but ten years old, it is fresh in appearance. Though built according to government plans, and therefore in general design like all French lycées, it was subscribed for by the town, thus showing that local effort is not stifled by government centralisation.

The staff of the school is in keeping with such a magnificent building. The number of officials required to look after the eight hundred pupils who attend the school seems large. First there is the headmaster, then the proctor, the chamberlain, two head ushers, about forty ushers, and some forty-five professeurs—a goodly array for a school in a town of 70,000 inhabitants. Of these, the proctor (censeur) attends to disciplinary matters, the chamberlain (économe) and his assistants direct the material affairs of the school, and the head ushers (surveillants généraux) control the ordinary ushers (répétiteurs).

As to the *professeurs*, they are a study, even to a Scot trained in the traditions of an educated teaching staff. For all these teachers, generally speaking, are *savants*. Some five of them, in the case of the Lycée Carnot, are Doctors of the Sorbonne, and nearly all are *agrégés* or Fellows of the University of France—that is, they have passed a competitive examination open to

all France, in which some six or seven candidates only are chosen in each subject yearly. On passing such an examination, the lucky persons are guaranteed a position in a secondary school, and may in time rise to the professorate. It is significant that the word *professeur* is used both for secondary teachers and for university professors. Thus the teaching staff is at once guaranteed a learned one, and their weekly service—on an average about fifteen hours—leaves them many an opportunity for self-improvement and self-advancement. Therefore, though their salaries are below those of the Scottish secondary teacher, these *professeurs* have leisure, position, and a dignity which our own teachers, except in limited instances, lack.

Under these conditions, the teaching is of a high order. Naturally it differs in different personalities, but there is a tradition here of high success. Many of the *professeurs* are trained in the Normal School at Paris, an institution higher and not lower than the university. Besides, they are usually more numerous than with us; the classes are smaller, about thirty in a class, and the curriculum, under recent regulations, is varied and liberal. As the pupil reaches the higher classes he may choose one of the following courses—A. Latin, Greek, French; B. Latin, English and German, French; C. Latin, French, Mathematics; D. Mathematics, English and German, French.

It is unnecessary to describe each class. Let us take these most helpful to our own educational system. One of the constant cries against secondary education in this country, especially in England, is the neglect of the mother tongue. University professors grumble at the efforts of their students in English composition, employers complain that a boy who can spin hexameters by the yard cannot write a sentence in current English. Neither class of individuals in France should have room for complaint. From his earliest years the order and the method of French composition is thoroughly engrained in the French boy, and for him to write a bad paragraph is as bad as for a British boy to write a clumsy sentence. The study of the French tongue is made the basis of all language teaching. What our inspectors have cried for in vain is here realised. The great classic authors are thoroughly digested. The dramatists Corneille, Racine, Molière, poets like Boileau, De Vigny, Victor Hugo, essayists such as Fénelon and La Bruyère, are analysed and criticised in a manner totally foreign to our traditions. Every metaphor is analysed, every false expression condemned and finally criticised by the pupils themselves. Then the choicest passages are learned by heart, so that when a French boy leaves school his mind is stored with the gems of his literature, and the critical spirit of his nation thoroughly imbued.

Or let us take that vexed question the teaching of modern languages. To the French how ridiculous our method appears of trying to get a foreigner to teach the language! The English teacher, for example, is always a Frenchman, but a Frenchman who has travelled in England or in America during his course of training by means of a bursary. In the case of the Lycée Carnot, the English master is an M.A. of Harvard, and speaks English fluently. Under the new regulations issued this year, an English assistant has been introduced, as in other lycées, to develop the conversational ability of the pupils.

The method of teaching is prescribed by government to be the direct conversational method. This has been introduced within the last three years, and it is proved that those who have been taught by the old grammatical method, so disastrously common in our schools, are even now inferior to the others, and will never be able to have that fluency which they might otherwise have attained. To carry out this method, all lessons are given as soon as possible in English, and even during the first year's course not a word of French is spoken during the whole lesson. English advertisements, pictures, and maps adorn the classroom, while the boys, with their keen sense of wit, have reproduced enlargements of typical English pictures, such as an English schoolmaster in hood and gown and a stout Policeman X. Notices like "Trespassers will be prosecuted," "Rub your feet on the mat," "Chops and steaks," adorn the walls, and while they strike the Briton with amusement, they show how thoroughly under good teaching and sound method the boys assimilate English. The result is that the youths who enter for their *baccalauréat* at the age of eighteen to twenty are often good speakers of English, or can at least readily comprehend it and make themselves easily understood. The same thoroughness pervades all teaching, for though it differs in individual cases, there is a tradition of teaching which fits in with French character.

The same thoroughness pervades the discipline, and here our British freedom is a felt want. For it is an axiom here that a French schoolboy, even of the age of eighteen to twenty (at which age he leaves school as he passes the *baccalauréat* or preliminary university examination) is essentially a boy. Under such an idea he is never allowed to go unattended. He is conducted from class to class by the usher. Clad in his school uniform, which represses all individuality, he takes two formal walks a week, lasting three hours each. On these occasions he is accompanied by an usher. He is never allowed to go out of school alone, unless, of course, he is a day boy. If a parent comes for his son, say of twenty years of age, he must reconduct him back to school. When the boys go home for the holidays an usher travels with them almost as far as the limits of the department in which the school is, and drops scholars at the various stations on the way. Should a pupil misbehave, he is detained by the proctor. If he is diligent, he gets a pass which gives him a longer holiday than his fellows should he have friends able to call for him. Otherwise he may compound these passes for punishment exercises should the teacher be willing. There is no corporal punishment.

This severe discipline is seen in the playground. A French boy, even a little boy, hardly ever plays, but contents himself with a spasmodic kick at the adopted Rugby ball or in walking briskly up and down the court arm in arm with his companion. The mere presence of two rows of sweet-smelling acacias dividing this playground shows a state of things a healthy British boy would not tolerate. 'Tis true that there is a football club for the highest class, who play instead of going the weekly walk. Under the influence of reading *The Boys' Own Paper* and *Chums*, some of the boys who study English, after much searching of heart on the part of the headmaster, have been permitted to form a tennis club, carefully restricted to eight members, while as a tremendous innovation a cricket club is being established, again under English influences. But all these are regarded as more or less dangerous innovations to be carefully safeguarded and to be watched, lest they encroach on study. One hour a day alone is allowed for tennis, even although the hours of recrea-

BRITISH MUSEUM

tion are much longer. Yet even with these hours of recreation the French boy from fourteen to nineteen or twenty puts in, or is supposed to put in, eleven hours' work per day. From 5.30, when he rises, till 8.30, when he goes to bed, his life is a continual round of studies and classes. There is no possibility of dodging bed at 8.30. The hapless usher superintends the dormitory. The key of this room is not even entrusted to him, but to the watchman, who five times every night goes his rounds to see that every boy, as well as the usher, is in his bed and that all is safe. Two emergency keys in glass cases await the hour of danger, but woe betide any one using them maliciously.

These ushers are a class apart. There is a great gulf between elementary and secondary teachers, the former being much inferior to the latter in scholarship and training. The ushers occupy an intermediate position. Some are students taking their degree, who find in the salary of £80 a ready means of sustenance. Some have their degree, and either await their nomination in a collège (of lower rank than a lycée) or aspire to the office of head usher or proctor. Their life is without responsibility, but is monotonous enough. If he is not a graduate he goes to bed at 8.30, rises at 5 or 5.30, and thereafter spends most of his day in conducting the pupils from class to class or in superintending their work in the studies. Yet their position is better than that of an elementary teacher, and many of them continue as ushers all their lives.

The religious difficulty now vexing England, and even known to exist in Scotland, is here reduced to a minimum by the fact that all religions are state-aided. As is natural, however, the Roman Catholics are in a majority, and the school chapel is exclusively for their use. The rabbi and the Protestant pastor are allowed to give religious instruction in school hours. "The" event of a schoolboy's life is his first communion service, when the Church of Rome receives, if only, as in the majority of cases, for a few years, the boys of ten or eleven into its fold with all its accustomed pomp and ceremony.

Incidents of such a nature are by no means frequent, and for the pupils life can only be described as "stale." The continual repression, the long studies, the want of games, the lack of home comfort, the condition of immorality common to all boarding schools, have either an enervating, an irritating, or a demoralising effect. It is difficult to meet a Frenchman who looks back on his schooldays at such a lycée with the fervour of a British lad. Where is the *esprit de corps*, the love of school? Therefore, while the organisation, the staffing, the teaching, and the method of a French secondary school have much to teach us, its discipline can only fix us more firmly in our own ideas.

BY MANY HANDS.

"Quot homines, tot sententiæ."

N.U.T. NOTES.

MUCH of the best and most valuable work of the N.U.T. is effected by means of public meetings; and possibly those organised by the county associations are productive of the most lasting results. The speakers in general demand are naturally our three members of Parliament. Next in request come the President and Vice-President, and, after these, *longo intervallo*, the candidates for the Union's Blue Ribbon and the gentlemen who have "passed the chair." Oddly enough, the members of the Executive least sought after are those representing the district in which the meetings are convened, which may (or may not) be significant testimony of the esteem in which they are held by their own constituents. The up-to-date county association secretary endeavours to secure, as chairman of the public meeting, some local personage—an M.P., Mayor, Chairman of County Council or Education Committee. This done, he issues dainty cards of invitation to all the leading public men and women in the district, asking them to support the appointed chairman, and to hear an address from the Union's chief speaker. Then the troubles of the last-named gentleman begin; for, by early posts, he receives courteous requests from those educationists anxious for the ventilation of a particular topic, which suggest that it may not be out of place if the speaker in his address can refer to such-and-such a subject. When such requests reach me, I hope I give them all the consideration they deserve. Lately, by a prominent County Councillor and Chairman of Technical Institute, I was asked to deal with the teaching of Hygiene, including the effects of alcohol, and I must say that, although I do not pretend to be a total abstainer, I have very considerable sympathy with those enthusiasts who are bent on keeping this question to the fore. When we find such bodies as the Committee of the County Councils' Association approving "of hygiene being made an essential element in the course of training of all teachers," and 14,918 medical men memorialising the educational authorities of the United Kingdom "to include, in the hygienic teaching which they desire, elementary instruction at an early age on the nature and effects of alcohol," we cannot mistake the strength of the movement. Lord Londonderry was wise in his generation when he stated that he foresaw a difficulty in carrying out the doctors' recommendation "because his department did not possess teachers who themselves knew what the memorialists desired to have taught." I agree entirely with the counsel given by Mr. Yoxall, who advises the temperance organisations to persevere in *voluntary* work only. In all probability, more harm than good would be done by making even so important a subject as Hygiene and Temperance *compulsory* in the nation's primary schools.

Temperance Teaching in Schools.

MR. JAMES HARRIS, the headmaster of the Barrow-in-Furness Higher Grade School, is one of those gentlemen who, at the summit of the professional ladder themselves, devote practically every moment of their "spare time"—save the mark!—to improving the lot of their less-favoured fellow-teachers. For the past three years he has worthily represented the North England electoral district at Russell Square, where his unique knowledge of all that appertains to secondary schools has been of incalculable service. He has acted throughout as Chairman of the Secondary Schools Enquiry Committee, and, in that capacity, been the direct means of collecting and arranging a multitude of facts which are now being judiciously used whenever the oppor-

Old Boys' Clubs.

tunity offers. During the past twelve months he has filled the breach, caused by Mr. W. A. Nicholls' temporary retirement, as Chairman of the Library Committee, and his great literary knowledge and abilities have served his fellow-members well. In connection with his school has been established the "Barrow Higher Grade Old Boys' Club," and I have just read, with both interest and pleasure, an account of its inaugural dinner, attended by some seventy-five members and guests. Mr. Harris had a great reception when he rose to respond to the toast of "The School." He gave a humorous description of the many difficulties he and his pupils had to encounter at the outset, and I was specially struck by this passage in his speech: "There was, however, one thing in those strenuous days—*the headmaster was brought much nearer to the pupils.* They felt they were fighting for the higher education of the town, and *that brought him very much nearer the boys, and they had a comradeship which they probably had not now owing to the large number of boys they had in the new building.*" This admission directly bears out my oft-expressed contention that large schools mean the inevitable non-existence of that *esprit de corps* so invaluable to the success of a school. The "Old Boys' Club" will do much to obviate what I feel is a disaster. It will keep the past students together, and will enable them, when assembled, to revive happy memories. The school magazine, *The Gradian*—a bright little paper, admirably edited—is another factor making for the continued prosperity of this excellent institution.

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Concerning "A Code of Honour."

AT the risk of appearing hyper-critical, I confess to feeling, from time to time, that there is a weakening—slight, perhaps, but still a weakening—in the sturdy professionalism which, until quite recently, characterised the various members of the Executive. I have imagined that this weakness has been evinced in several little ways during the past twelve months, and in none so particularly as in the Executive's attitude towards that frequently discussed topic, "A Code of Professional Honour." Fifteen months ago the Executive decided by a considerable majority to place the motion, "That the time is now opportune for the establishment of a Code of Professional Honour," on the Conference Agenda, and I was chosen to introduce it. The subject obtained almost the foremost place amongst the resolutions chosen for discussion in the Private Sessions, and only the inordinate time taken up by a consideration of the financial reports prevented the matter being ventilated. This year the question has been see-sawing between the Executive and the Education Committee for two or three months, and at last, in an attenuated third session (only 27 out of 48 members being present) the Executive by an even vote (12 to 12, 3 not voting) decided on a *laissez-faire* policy. Never have I regretted my enforced absence from an Executive session so greatly as when reading the *Schoolmaster's* report of the debate. Mr. Baddeley's almost puerile objection to a Code "committed to paper" would apply with equal force to the Decalogue or to any of our country's laws; and, although I agree entirely with Mr. Coward's contention that the dishonourable man would "not be made honourable because he had something written down for his guidance," I think he is wrong in the estimate he places on the value of the suggested Code to the young teacher. Mr. Winfield's startling assertion, that "if rules were written down, it might be inferred that anything was permissible which was not included therein," is perhaps the most significant testimony of that gentleman's fitness for his present position. I have spoken to meetings of "teachers only" on this subject times without number, and if the reception it invariably has wherever I go be any criterion of the general attitude on the question, the Executive are in for a "big fall" at Llandudno. My letter-box bears constant evidence of the general interest it evokes, and I only hope to have the opportunity of participating in the debate likely to arise on Easter Tuesday afternoon.

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"B. and O." Council.

MR. W. BICKERTON, the accomplished and indefatigable Secretary to the Fund, was pardonably proud at being able to report to the Council that the income for 1904 had not only exceeded his most sanguine expectations, but had created a new "record" for ordinary income for any one year. Since Mr. Bickerton took the helm, about the middle of 1899, the amounts annually raised have been:—

1899 . . .	£ 8,140 13 9
1900 . . .	12,494 3 9
1901 . . .	11,141 19 7
1902 . . .	15,897 1 2
1903 . . .	16,671 15 0
1904 . . .	18,404 10 5

These magnificent sums have been procured through what the Secretary rightly terms "the devoted efforts of our fine body of workers throughout the country." Yet no inconsiderable portion of the credit is due to Mr. Bickerton himself, whose exceptional organising abilities had been fully proved before his era at Russell Square. I see no reason why the income for 1905 should not be larger than ever. The number of members in the Union is increasing very rapidly, and, *pari passu*, the demands on its Benevolent and Orphan Fund are bound to grow. My main regret is that there still exists an appreciable number of teachers who apparently know nothing of the Fund's existence, *until they or their families are in need.* The roll of honour for 1904 is headed by—

Ampthill and Bedford, with a total of .	£670 0 0
Rhondda, " " .	550 5 10

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"B. and O." Council Nominations.

IN no less than eight of the twelve electoral districts the retiring members of the Council are indulged with a "walk over," and thoroughly deserved is their respite from worry and strife. The nominations in the remaining districts are:—

District.	Persons Nominated.
1. Yorkshire . . .	Miss M. Simpson, Messrs. J. Chilman, W. C. Cockram, W. S. Wheat, J. H. White.
2. S. Midland . .	Miss S. Dix, Miss E. M. Hawley.
3. N. London . .	Messrs. J. W. Bunn, W. R. Hamblett, T. P. May, A. Tutt, G. S. West.
4. S. London . .	Miss E. Ansell, Mrs. E. M. Burgwin, Messrs. W. Brenchley, R. J. P. Campbell, C. J. Chase.

Of the five candidates anxious to represent Yorkshire, the best known are Miss Simpson (the strenuous and

successful Scarborough Secretary), and my old college friend, Mr. J. Chilman, of Hull, and between these two the issue will lie. Two particularly capable women are opposing each other in the S. Midlands, and, although "anything may happen," I think Miss Dix will retain her seat. In both North and South London five candidates are fighting for four seats. Personally, I see no reason to disturb the present admirable representation, and I do not think the new nominees capable of effecting it.

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The Executive Election.

SHORTLY after these "Notes" are published the 54,000 members of the Union will be invited to select the Executive for the coming year. Until 1898, the Executive comprised twenty-four members, in addition to the officers, and these members were returned by the votes of the whole country. At the Swansea Conference of 1897 a great change was ordained, and the country ordered to be split up into twelve districts, each returning three members. In 1901 the Yarmouth Conference decreed that when a constituency exceeded 4000 members a fourth member should be allowed. The effect of some of the changes above referred to may be seen in the table subjoined:—

Year.	Number to be Elected.	Number of Candidates.	Average Number per District.	Districts with no Contests.	Old Members Unseated.
1898	36	86	7·2	...	3
1899	36	58	4·8	2	4
1900	36	60	5·0	1	4
1901	36	52	4·3	2	2
1902	38	56	4·7	2	2
1903	41	59	4·9	...	3
1904	42	58	4·8	4	2
1905	44	65	5·4	2	...

The very large number of candidates this year may be evidence of exceptional Union activity, but of course the majority of the twenty-five new aspirants to fame have no earthly chance of success. In N. England the sitting members are indulged with a "walk over," but a particularly keen contest will be witnessed in Lancashire. I expect to see Mr. H. Pearson, the Liverpool class master, displace one of the retiring quartette. In Yorkshire Mr. Blenkinsop seems safe for the reversion of Mr. T. P. Sykes's seat, whilst in the N. Midlands that excellent Unionist, Mr. W. Steer, of Derby, comes in without a contest. The opposition to the old members in the S. Midlands is comparatively unimportant, and strong man though Mr. J. Baldwin admittedly is, he will not displace any present member for East Anglia. Probably Mr. Wing will succeed Mr. Sandford in S. England, and nothing better for the Union can happen than the return of Mr. Egbert Ruse, of Plymouth, as the additional member for W. England. The retiring members for Wales seem to have an easy task before them, as have their colleagues in W. London. The contest in East London was exceedingly close last year, Mr. R. T. Mawbey being defeated by the smallest possible margin of votes. He is a candidate this year, and has a great chance of success. In South London Mr. W. A. Nicholls is striving to win the seat he lost—to my very great regret—a year ago. One need not be a very bold prophet to foretell the triumphant return of the popular President of the London Teachers' Association as *one* of the successful four. Whom he will displace I cannot attempt to anticipate.

A. C.

THE N.U.T. VICE-PRESIDENCY.

SKETCHES OF THE CANDIDATES.

THE National Union of Teachers has an excellent rule: "That the Vice-President of one year shall be the President for the succeeding year, and shall hold office as Ex-President during the three years next following, providing membership of the Union be retained." Thus, while the contest is nominally for the Vice-Presidency, it is actually for the "Blue Ribbon" of the Union, to say nothing of the sweets of office for a comparatively long period of five years. It will be remembered that last year's struggle resulted in the return of Mr. Tom John by an enormous majority, whilst the unsuccessful candidates were placed in this order:—

	Votes.
Sykes, Thomas P. (Bradford) . . .	6134
Blackburn, Fred C. (London) . . .	5221
Phillips, Edwin R. (London) . . .	3809
Peaker, Frederick (Leeds) . . .	Retired

Mr. Peaker's acceptance of the editorship of an educational journal caused his withdrawal a year ago, but the remaining gentlemen named above are again in the field, reinforced by Mr. A. R. Pickles, B.A., who is likely to make "a brave show" on going to the polls for the first time. Here are some interesting figures in connection with recent

V.-P. ELECTIONS.

Year.	N.U.T. Membership.	Voting Papers Returned.	Number of Candidates.	Winner.	Winner's Poll.	Winner's Percentage of Votes.
1898	38,687	29,179	3	Clancy	15,506	53·1
1899	40,485	28,884	5	Jackman	7,679	26·6
1900	42,005	28,665	4	Blacker	13,711	47·8
1901	43,614	30,186	3	Croft	15,428	51·1
1902	45,123	31,494	4	Coward	16,109	51·1
1903	47,326	34,220	2	Sharples	19,302	56·4
1904	50,650	35,644	5	John	16,825	47·2

In accordance with our usual custom we give below brief accounts of the quartette of aspirants, and in doing so express the earnest hope that all readers of the *Practical Teacher* qualified to vote will promptly do so, and return their papers to Russell Square. It was a little disheartening last year to see that 15,000 Unionists, either through apathy or accident, did not avail themselves of the privilege *and duty* of exercising their professional franchise.

MR. F. C. BLACKBURN,

the headmaster of the Maryland Point Council School, missed, in 1904, by a few hundred votes, the *éclat* and prestige which invariably attach to the position of "runner-up" in the Vice-Presidential campaign. Yet his poll was sufficiently substantial to encourage him to come forward again, in the sure and certain hope that, ere long, his day of victory will come. He began his professional career in a mixed half-time school, completing a five years' apprenticeship under the late West Ham School Board. The years 1881–2 he spent at the old Borough Road Training College, an institution, by the way, which has furnished an astonishingly large number of members of the Executive, and four of the last ten Presidents of the Union. Since leaving Borough Road, Mr. Blackburn has taken a very prominent and altogether fearless part in every educational and pro-

fessional question, where his vigorous policy has secured for him the enthusiastic support of head and class teachers in all grades of schools. In the darkest days known to class teachers, when the men's maximum salary (outside London) was £90 or £100, and increments were anything except automatic, he was one of the hardest workers in the West Ham Class Teachers' Association, and his sympathies to-day are as keen, and his readiness to help his less fortunate brethren as prompt, as in the early nineties. After filling the highest and most responsible offices in the local branch of the Union, he was returned—at the head of the poll—as one of the Executive members for East London, and, year by year, his constituents have evinced their confidence by according him the premier position. At the Executive, his best work has admittedly been done on the Finance, Press, and General Purposes Committee, of which he is the Chairman. He has proved, in all respects, a fitting and worthy successor to Mr. Peaker, than which we can accord no higher praise. His great heart, added to a fine grasp of financial questions, secured his election to the chair of the Teachers' Provident Society five years ago, and his colleagues are enthusiastic and unanimous regarding his real ability in that capacity. He is nominated by Bromley, East Ham, Jersey, Lowestoft, Southampton, Tottenham, Walthamstow, West Ham, Westminster, Wrexham, and about a score other local associations. He is an effective speaker of the strenuous type, and his programme stamps him a thorough and advanced educationist. Last year we stated that "whenever the Union chooses him as its chief Executive officer, it will have a gentleman of grit and determination who thoroughly understands its needs," and twelve months' additional knowledge only emphasises the correctness of our previous conviction.

Mr. E. R. Phillips

is nominated for the Vice-Presidency by over a score of associations, amongst them being Bristol, Chelsea, East Lambeth, Finsbury and City, London (E.), Plymouth, St. Pancras, Southwark, West Lambeth, and Woolwich. A glance at these names seems to show that Mr. Phillips is the popular candidate with the London teachers. And worthy indeed is he of the distinction; for much of his best work for the profession was done for the organisation formerly known as the M.B.T.A.; and he is pardonably proud of the share he had in securing the abolition of the ridiculous and vexatious C. P. regulations, and still more of the stand he took on the religious tests question. He is still in the prime of life, and, at the same time, one of the Union's "grand old men," for he is one of the very few still left to us who helped to establish the N.U.E.T. (as it was then called) in 1870. Few men have had a more comprehensive professional experience than Mr. Phillips. At a very early age he became a monitor in an infants' school. Then when he was sufficiently "old" he was indentured as a pupil-teacher in a mixed school of some eighty or ninety in average attendance, in a beautiful Devonshire village. After his college training at Exeter in 1867–8 he served as headmaster of a country school for six months, when an attempt to reduce his emoluments caused him to come to London as an assistant master in a Church school. Next he served in a small town school in Devon for four years, on the completion of which term he returned to London as headmaster of the Alexis Street Board School, Bermondsey. He left there in 1903, after eight-and-twenty years' successful labours, to assume charge of the Halford Road Board School, Fulham, where he yet remains. Thus he knows, at first hand, the difficulties and anxieties of every class of teacher, and his experience is ever available in assisting to the right conclusion. Mr. Phillips was treasurer of the M.B.T.A. from 1877 to 1880 and its President in 1891. He has been twice President of the Southwark Association, first in 1879, and again in 1898. He has been a representative at nineteen Conferences of the N.U.T., has served on the Executive of the Union for three years as District Union representative, and for five years as one of the members for the South London electoral district. He has served his fellow-citizens well and faithfully for over sixteen years, and was the last Chairman of the Vestry of the important metropolitan borough of Camberwell. At the present moment he is acting as Chairman of the Libraries and Museums Committee, which has the general supervision of six libraries, one art gallery, and one museum. He is emphatically a good all-round man, and absolutely in the front rank of the Union's platform speakers. He is a fine debater, and never uses an unnecessary word. We sum up as we did twelve months ago: "Of dignified and impressive appearance, cultured manner, convincing and earnest style, Mr. Phillips is a gentleman calculated to bring credit and renown to any office or position to which he may be appointed."

Mr. A. R. Pickles, B.A.,

declined nomination for the Vice-Presidency twelve months ago, probably because his former Lancashire colleague, Mr. George Sharples, was just about to enter on what has proved to be a most successful year of office as President of the Union. His modest abstention has, however, made little difference to his prospects of ultimate success; and the fact that in his first candidature he has been nominated by over eighty associations is significant of the strength of his following in the country. Amongst these associations are Barrow-in-Furness, Birmingham, Blackburn, Bolton, Burnley, Cardiff, Exeter, Greenwich, Hackney, Leicester, Liverpool, Newport (Mon.), Northampton, Oldham, Rhondda and Pontypridd, Salford, North Staffs., West Bromwich, Worcester City, and York—a truly formidable list. Mr. Pickles has been one of the "members for Lancashire" since the introduction of the scheme of electoral districts in 1898, though he has been continuously a member of the Executive since December 1896, when he went up to Russell Square as a representative of the Mid-Lancashire District Union. Not one of his friendly rivals in the pending contest has so long a period of Executive service to his credit as Mr. Pickles, and his friends are justifiably drawing attention to the circumstance. His great abilities early called him to the chair of the Organisation Committee, whose operations he directed from 1899–1901. In 1902, a sphere of greater usefulness awaited him as an officer of the Education Committee; and during the last two years, as Chairman of the Education Committee, he has shown himself not inferior to such protagonists as Mr. Sharples and the revered Mr. Robert Wild. The 1902 Education Act was answerable for a mild revolution in Union organisation, and although no longer head of the committee, Mr. Pickles was responsible for the largest Reorganisation Scheme ever placed before the Union. Much of the general esteem and admira-

tion for Mr. Pickles is indubitably owing to a series of magnificent speeches at the Easter Conferences. It would perhaps be invidious to characterise them, in every case, as the speeches of the week, but this is certain, that any subject entrusted to his hands will be dealt with in masterly style, great ability and intuition being allied to stupendous industry in a fashion uncommon even to the leading members of the teaching profession. Our own columns have borne frequent reference to his achievements, and Mr. Pickles is bound to "arrive"—it may not be this year, of course—at the Presidential chair, for he is a *worker* of the first water. On such subjects as the Supply and Training of Teachers, the Co-ordination of the various types of Schools, the Teachers' Register, and the Relations between Teachers and Education Authorities, he is an acknowledged authority, and his academic distinction is a benefit and pleasure to his profession, as well as a delight unto himself. Only the plethora of Union work prevented his acceptance of the offer of the Lancashire teachers to elect him as their representative on the Lancashire County Education Committee. What he was physically unable to do for Lancashire alone, he performs cheerfully for the whole of the country. Whilst gentlemen of Mr. Pickles' capacity and experience—to say nothing of personal culture, refinement, and charm of manner—are willing to become candidates for Vice-Presidential honours, the public estimation of the Union will not only be retained, but may possibly be enhanced.

MR. T. P. SYKES,

the talented headmaster of the Great Horton Council School, Bradford, is the gentleman who, by fairly general consent, will be acclaimed Vice-President of the Union sometime about 4.30 P.M. on Easter Monday next. Last year our notice of him concluded with the words: "It requires no great gift of prophecy to foretell that in two years, at the outside, he will be Vice-President of the Union," and nothing has transpired to make us vary this opinion. He was the "runner-up" in 1904, and what this position is worth can be gathered from the intelligence that this year no less than 185 associations from all over the country have nominated him for the Vice-Presidency. Considerations of space prevent our printing more than a few of the most prominent, such as Barnsley, Barry, Birkenhead, Bradford, Burton-on-Trent, Cambridge, Carlisle, Derby, East Derbyshire, Dewsbury, Great Yarmouth, Grimsby, Halifax, Harrogate, Hartlepools, Huddersfield, Hull, Ipswich, Kettering, Leeds, Lincoln, Llandudno, London (West) Suburban, Luton, Manchester, Merthyr, Newcastle-on-Tyne, Norwich, Nottingham, Peterborough, Reading, St. Albans, St. Helens, Scarborough, Sheffield, South Shields, Swansea, Swindon, Tees-side, Walsall, Watford, Willesden, Winchester. For over twenty-one years Mr. Sykes has been a member of the Union, and during this period has held practically every post at the disposal of his fellow-teachers. He has been President, Secretary, and (for twelve years) Treasurer of the Bradford Teachers' Association. He is a Past-President both of the West Yorks District Union and of the Bradford Teachers' Representative Association, and, in the ancient days of School Board elections, Mr. Sykes was ever prominent on the platform of the teacher-candidate. He is a member of the Executive of the Half-Time Council, and the local Secretary of the Teachers' Provident Society. He is a life member of the "B. and O." Fund of the Union, and also an annual subscriber to the Church Benevolent Fund. The charitable side of the Union's work has always appealed to him very strongly indeed, and by means of school concerts, large sums of money have been raised by the Great Horton Council School. For the past seven years Mr. Sykes has been a member of the N.U.T. Executive, and to-day he occupies the responsible and exacting chair of the Tenure Committee. This position necessitates hundreds of hours' weary travelling in frigid and draughty trains, many a lonely drive, many dreary tramps, but Mr. Sykes never shrinks from what appertains to his high office. With him 'tis ever a case of *noblesse oblige*. His views on both professional and educational questions we gave in considerable detail last year, and it is not necessary to repeat them. It will suffice if we state that in the matter of educational policy he goes straight for the proper education of the child in well-lighted, well-equipped, well-staffed schools. *Ça va sans dire* that on all professional questions he is sound as a bell. He is a lucid speaker, with a singularly taking style. He is an accomplished musician, and has lectured on "Practical School Music" to the delight of hundreds of teachers from Land's End to Berwick-on-Tweed. Mr. Sykes can pen an article, either grave or gay, with the same ease and felicity as he can sing or speak. His accession to the Vice-Presidency will be a source of gratification to his fellow-townsmen, of pleasure and pride to his fellow-Yorkshiremen, and of contented satisfaction to the vast majority of his fellow-Unionists.

NOTES FROM THE NORTH.

ERE these notes are read I trust we shall have the first reading of the resurrected Education Bill. No doubt the promotion of Mr. Graham Murray, Secretary for Scotland, to the highest legal position in Scotland is a factor that will require to be reckoned with. His removal from the House of Commons, coupled with the fact that the new Secretary belongs to the Upper House, is bound to have some effect on the chances of the Bill. One consolation is left us, and that is, that there are very many and clear indications that the Education house has been set in order, and that there is still one left in the House of Commons who has been in close contact with Mr. Murray on the subject—I refer to Mr. Scott Dickson, the Lord Advocate. I may be allowed here to express the deep sense of satisfaction entertained by all members of the teaching profession at the well-merited promotion the late Secretary has received. These feelings, as was to be expected, are not unmixed with a great sense of loss, inasmuch as it was confidently hoped that he would be at the helm once again to pilot the Bill past or through the difficulties that it may yet encounter ere it is safely anchored.

The Scottish Education Bill.

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WHAT will probably be Mr. Graham Murray's last utterance on the Bill was made on 20th January at Partick, and his reference to the qualifications and position of the teacher are worthy of note. After all was said and done he thought the real efficiency of any system of education would in the long run depend upon the class of person who was the teacher.

The Teachers' Sympathiser.

He was not one of those who wished to see the teacher put in the position of the master instead of the servant. He did not wish him to be a sort of trade unionist who could dictate his own terms. On the other hand, subject to that, he entirely avowed himself the teachers' sympathiser. It seemed to him that if they were to have education bettered, they could only do it through the character and attainments of those who taught, and they could only get that character and those attainments if they made the profession a sufficiently attractive profession to attract the best men to it. And if it was for nothing else, he thought that would settle the question of larger areas, because it was perfectly impossible to have a career for a schoolmaster if there was not a larger area where he might, if he was successful, move from place to place and get better employment than where he first happened to take it in some country school.

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I HAVE on more than one occasion in these notes expressed the hope that even if the Bill should for a longer or shorter time remain in suspended animation, the question of the training of teachers should be seriously and at once tackled by the Department. This has been done by a Memorandum and Minute dated 30th January, though not issued until 3rd February, the very day on which it may be noted that the Secretary for Scotland met a deputation from the Educational Institute on the question. At perhaps no time in the history of the Institute have their opinions, as embodied in Memorandum, been more closely followed than in the present instance. Whether this happened by design or accident I shall not venture to say. I should like to have placed the Memorandum of the Institute and the Minute of the Department side by side to show how closely the one approximates to the other, but space forbids. The object of the Minute in establishing committees for the training of teachers is to enlarge and improve existing facilities. In doing so, the Secretary for Scotland desires at the same time to ensure that that training shall be brought into as close connection with the University organisations as the attainments of the students upon entering admit of. The Minute makes no change necessary in the position of the present Training Colleges, but it provides a means whereby transference of management to the newly-constituted committees may be easily effected under adequate guarantees for the continuance of the religious instruction at present given in these colleges.

The Training of Teachers.

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THE Minute provides that there shall be established, in connection with the Universities of St. Andrews, Glasgow, Aberdeen, and Edinburgh respectively, a Committee for the Training of Teachers. Each committee is to appoint its own chairman, fix its own quorum, and delegate such parts of its duties as it may see fit to sub-committees of members of its own body with or without added members. Each committee is to have power to provide, whether in University classes or otherwise, courses of instruction suitable for the training of teachers (including teachers of secondary schools). These courses may include, if the committee so determine, instruction in religious subjects. For the present the courses are to be held in towns where a University, or part of a University, is situated, but the committee is to have power to institute, with the consent of the Department, subsidiary courses of training at appointed centres in connection with either a secondary or a higher grade school.

Universities as Centres.

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FROM and after the 31st July 1905 grants for the training of King's Students shall cease to be payable to the existing local King's Studentship Committees. The new committees are to take over the responsibilities of the old committees undertaken towards students in training or towards officers employed in their instruction. In the event of the body of management of any existing training college or colleges resolving to demit its powers of management in favour of any of the newly constituted committees and to transfer the college premises and equipment, the new committee shall have power to receive the same and pay therefor such purchase money or annual rent as may be agreed upon, provided always that no payment shall be made for the purchase or rent of any premises which are held in trust by the said body of management for the purpose of training teachers. This is a most ingenious and politic provision. This will doubtless prevent any haggling that may have been threatened over the transference of any Church college. The teachers in the present training colleges are either to be retained or pensioned.

Transfer Arrangements.

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WHEN a training college so transferred is the property of, or is held in trust by, the representatives of any Church or religious denomination, it shall be a condition of such transference that provision shall be made therein for religious instruction in accordance with the views of the said Church or denomination to an extent not less than that which is at present customary in the college so transferred, which instruction may either be provided by the accepting committee or the transferring Church or denomination, as may be agreed between them; and, further, where the accepting committee undertakes to provide such instruction on its own behalf, it shall be a condition that it also undertakes to afford adequate facilities for the periodical inspection of the said instruction by duly accredited representatives of the transferring Church or denomination, under conditions to be determined by the Department. The new committee is to co-opt as fully privileged members representatives of the transferring Church or denomination. In this way the religious difficulty is solved and the use and wont of religious instruction is maintained.

Religious Instruction Arrangements.

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THE new committees are to consist of members elected by the University Court of the various Universities. In addition to these there are to be representatives chosen from technical institutions. The School Boards of the University towns are to be represented, and to these are added members from other School Boards in the territorial divisions into which Scotland is divided. The managers of secondary schools are to be represented by three members in each division. These form the provisional committee. Each committee is to have the power to co-opt as members three persons actively engaged in the work of education in schools or colleges

Committees.

within the counties and burghs represented on the committees. The election of these members, of whom at least one shall be engaged in teaching in a school under the Code, and one in a secondary school, shall be made by the provisional committee, after consideration of representations made to them by associations of teachers or by other bodies or individuals interested in the work of education. His Majesty's Chief Inspector for each territorial division is to be added as an assessor, without a vote.

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IT is expected that if the Education Bill passes, these committees will become the Provincial Councils, and will be invested with the general powers that were designed for these bodies in last year's Bill. It will be noticed that the municipalities have no representatives on the committees, the members are to be drawn entirely from those interested in education. In some respects I consider this an improvement on the former proposal. It is a continuation of the *ad hoc* proposal contained in the Bill, and seems to give the deathblow to the somewhat belated struggle for municipal influence. As a forerunner of the Education Bill it is a step in the right direction, and the criticism the scheme will receive will, I believe, be unimportant. Mr. Graham Murray in his last, and by no means his least, valuable public service has shown that he possesses a rare combination of tact and strength. The only criticism that may be offered will, I think, be confined to the question whether so important a measure should be accomplished by the stroke of the pen in a *Minute* (no pun intended). But I am inclined to think that the profession will pass over the detail in view of the comprehensive and valuable scheme now proposed.

Provincial Councils.

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THE Institute has now before it all the likely candidates for the Presidentship and Vice-Presidentship. I propose in the next month's notes to give a brief sketch of the various candidates for these offices. It is, indeed, a good thing that by the action of the General Committee of Management the contest will be fought out apart from the local considerations of Congress. The Carnegie Trust has invited the Institute to hold its Congress next New Year at Dunfermline, and the General Committee is to recommend to the annual meeting the acceptance of the invitation. This is the first time that an outside educational body has invited the Institute, and I was very pleased to see the unanimity with which the offer was accepted. If, as we expect, the Bill for Scotland is passed, we shall have a most memorable Congress in a most memorable year.

R. G.

E.I.S. Doings.

FRIDAY EVENING IN A GALLOWAY SCHOOL-HOUSE.

AND what is Galloway more than any other part of the Land of Scots? Nay, but there shall be no *apologia:* we are a peculiar people, we of the ancient province. We are jealously exclusive of whatever would intrude from Ayrshire, and we are not more than barely tolerant of what comes from be-east the Brig En' o' Dumfries.

Galloway, we say, is adjoined by the neighbouring kingdoms of Scotland and England, and is within comfortable distance of Ireland and Man. Bounded on the north by the Lead Hills, its shores on the south are washed by the rude tide-rip of the steel-backed waves of the Shirra-sung Solway. The Gallovidian feels that he is abundantly justified when he annexes with trifling variation the words of the Morayshire poet, and says—

"There's nae land like Galloway."

So then it is Friday evening, school has been dismissed, and the door locked; and your pupils have started on their two, four, five or even six mile tramp to their several homes. More fortunate the teacher: *Domus accepit eum laeta atque uxor optima*, ere their journeys have well begun.

Quae vides? you ask of the little man who opens the door for you, and he replies with a tag from old Q. H. F.

"Jam satis terris nivis atque dirae
Grandinis misit Pater,"

which is not only good Latin, but indubitable fact. For the Father of gods and men has in its due turn led back *informis hiems.*

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But there are other moods. As you read his limpid numbers you pass "from grave to gay, from lively to severe." Our poet has noted Life's little Ironies.

"Divesne prisco natus ab Inacho
Nil interest, an pauper et infima
. . . Omnes eodem cogimur."

He was not one of those who wished to see the teacher put in the position of the master instead of the servant. He did not wish him to be a sort of trade unionist who could dictate his own terms. On the other hand, subject to that, he entirely avowed himself the teachers' sympathiser. It seemed to him that if they were to have education bettered, they could only do it through the character and attainments of those who taught, and they could only get that character and those attainments if they made the profession a sufficiently attractive profession to attract the best men to it. And if it was for nothing else, he thought that would settle the question of larger areas, because it was perfectly impossible to have a career for a schoolmaster if there was not a larger area where he might, if he was successful, move from place to place and get better employment than where he first happened to take it in some country school.

* * *

I HAVE on more than one occasion in these notes expressed the hope that even if the Bill should for a longer or shorter time remain in suspended animation, the question of the training of teachers should be seriously and at once tackled by the Department. This has been done by a Memorandum and Minute dated 30th January, though not issued until 3rd February, the very day on which it may be noted that the Secretary for Scotland met a deputation from the Educational Institute on the question. At perhaps no time in the history of the Institute have their opinions, as embodied in Memorandum, been more closely followed than in the present instance. Whether this happened by design or accident I shall not venture to say. I should like to have placed the Memorandum of the Institute and the Minute of the Department side by side to show how closely the one approximates to the other, but space forbids. The object of the Minute in establishing committees for the training of teachers is to enlarge and improve existing facilities. In doing so, the Secretary for Scotland desires at the same time to ensure that that training shall be brought into as close connection with the University organisations as the attainments of the students upon entering admit of. The Minute makes no change necessary in the position of the present Training Colleges, but it provides a means whereby transference of management to the newly-constituted committees may be easily effected under adequate guarantees for the continuance of the religious instruction at present given in these colleges.

The Training of Teachers.

* * *

THE Minute provides that there shall be established, in connection with the Universities of St. Andrews, Glasgow, Aberdeen, and Edinburgh respectively, a Committee for the Training of Teachers. Each committee is to appoint its own chairman, fix its own quorum, and delegate such parts of its duties as it may see fit to sub-committees of members of its own body with or without added members. Each committee is to have power to provide, whether in University classes or otherwise, courses of instruction suitable for the training of teachers (including teachers of secondary schools). These courses may include, if the committee so determine, instruction in religious subjects. For the present the courses are to be held in towns where a University, or part of a University, is situated, but the committee is to have power to institute, with the consent of the Department, subsidiary courses of training at appointed centres in connection with either a secondary or a higher grade school.

Universities as Centres.

* * *

FROM and after the 31st July 1905 grants for the training of King's Students shall cease to be payable to the existing local King's Studentship Committees. The new committees are to take over the responsibilities of the old committees undertaken towards students in training or towards officers employed in their instruction. In the event of the body of management of any existing training college or colleges resolving to demit its powers of management in favour of any of the newly constituted committees and to transfer the college premises and equipment, the new committee shall have power to receive the same and pay therefor such purchase money or annual rent as may be agreed upon, provided always that no payment shall be made for the purchase or rent of any premises which are held in trust by the said body of management for the purpose of training teachers. This is a most ingenious and politic provision. This will doubtless prevent any haggling that may have been threatened over the transference of any Church college. The teachers in the present training colleges are either to be retained or pensioned.

Transfer Arrangements.

* * *

WHEN a training college so transferred is the property of, or is held in trust by, the representatives of any Church or religious denomination, it shall be a condition of such transference that provision shall be made therein for religious instruction in accordance with the views of the said Church or denomination to an extent not less than that which is at present customary in the college so transferred, which instruction may either be provided by the accepting committee or the transferring Church or denomination, as may be agreed between them; and, further, where the accepting committee undertakes to provide such instruction on its own behalf, it shall be a condition that it also undertakes to afford adequate facilities for the periodical inspection of the said instruction by duly accredited representatives of the transferring Church or denomination, under conditions to be determined by the Department. The new committee is to co-opt as fully privileged members representatives of the transferring Church or denomination. In this way the religious difficulty is solved and the use and wont of religious instruction is maintained.

Religious Instruction Arrangements.

* * *

THE new committees are to consist of members elected by the University Court of the various Universities. In addition to these there are to be representatives chosen from technical institutions. The School Boards of the University towns are to be represented, and to these are added members from other School Boards in the territorial divisions into which Scotland is divided. The managers of secondary schools are to be represented by three members in each division. These form the provisional committee. Each committee is to have the power to co-opt as members three persons actively engaged in the work of education in schools or colleges

Committees.

within the counties and burghs represented on the committees. The election of these members, of whom at least one shall be engaged in teaching in a school under the Code, and one in a secondary school, shall be made by the provisional committee, after consideration of representations made to them by associations of teachers or by other bodies or individuals interested in the work of education. His Majesty's Chief Inspector for each territorial division is to be added as an assessor, without a vote.

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Provincial Councils.

IT is expected that if the Education Bill passes, these committees will become the Provincial Councils, and will be invested with the general powers that were designed for these bodies in last year's Bill. It will be noticed that the municipalities have no representatives on the committees, the members are to be drawn entirely from those interested in education. In some respects I consider this an improvement on the former proposal. It is a continuation of the *ad hoc* proposal contained in the Bill, and seems to give the deathblow to the somewhat belated struggle for municipal influence. As a forerunner of the Education Bill it is a step in the right direction, and the criticism the scheme will receive will, I believe, be unimportant. Mr. Graham Murray in his last, and by no means his least, valuable public service has shown that he possesses a rare combination of tact and strength. The only criticism that may be offered will, I think, be confined to the question whether so important a measure should be accomplished by the stroke of the pen in a *Minute* (no pun intended). But I am inclined to think that the profession will pass over the detail in view of the comprehensive and valuable scheme now proposed.

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E.I.S. Doings.

THE Institute has now before it all the likely candidates for the Presidentship and Vice-Presidentship. I propose in the next month's notes to give a brief sketch of the various candidates for these offices. It is, indeed, a good thing that by the action of the General Committee of Management the contest will be fought out apart from the local considerations of Congress. The Carnegie Trust has invited the Institute to hold its Congress next New Year at Dunfermline, and the General Committee is to recommend to the annual meeting the acceptance of the invitation. This is the first time that an outside educational body has invited the Institute, and I was very pleased to see the unanimity with which the offer was accepted. If, as we expect, the Bill for Scotland is passed, we shall have a most memorable Congress in a most memorable year.

R. G.

FRIDAY EVENING IN A GALLOWAY SCHOOL-HOUSE.

AND what is Galloway more than any other part of the Land of Scots? Nay, but there shall be no *apologia:* we are a peculiar people, we of the ancient province. We are jealously exclusive of whatever would intrude from Ayrshire, and we are not more than barely tolerant of what comes from be-east the Brig En' o' Dumfries.

Galloway, we say, is adjoined by the neighbouring kingdoms of Scotland and England, and is within comfortable distance of Ireland and Man. Bounded on the north by the Lead Hills, its shores on the south are washed by the rude tide-rip of the steel-backed waves of the Shirra-sung Solway. The Gallovidian feels that he is abundantly justified when he annexes with trifling variation the words of the Morayshire poet, and says—

"There's nae land like Galloway."

So then it is Friday evening, school has been dismissed, and the door locked; and your pupils have started on their two, four, five or even six mile tramp to their several homes. More fortunate the teacher: *Domus accepit eum laeta atque uxor optima*, ere their journeys have well begun.

Quae vides? you ask of the little man who opens the door for you, and he replies with a tag from old Q. H. F.

"Jam satis terris nivis atque dirae
Grandinis misit Pater,"

which is not only good Latin, but indubitable fact. For the Father of gods and men has in its due turn led back *informis hiems.*

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But there are other moods. As you read his limpid numbers you pass "from grave to gay, from lively to severe." Our poet has noted Life's little Ironies.

"Divesne prisco natus ab Inacho
Nil interest, an pauper et infima
. . . Omnes eodem cogimur."

"Nil interest, divesne an pauper," for

"Pallida mors aequo pulsat pede pauperum tabernas
Regumque turres."

The verses are cut into a tombstone in the kirkyard of Anwoth, around which sleep the rude forefathers of the hamlet, to whom Sunday after Sunday, nearly three centuries ago, the guid, godly Samuel Rutherford was wont to reason of righteousness, of temperance, and of judgment to come.

"Omnes eodem cogimur:" yet is he not greatly terrified by the prospect. He is not religious overmuch.

"Parcus deorum cultor:" you bowed not often it may be in the temples of the state religion, and before the statues of the great Olympians; and yet, the pure and pious worship of rustic tradition, the faith handed down by the homely elders, with that you never broke. Clean hands and a pure heart, these with a sacred cake and shining grains of salt, you could offer to the Lares. Thus Mr. Andrew Lang.

Easy-going Horace! he was wont to take but little thought for the morrow.

"Quid sit futurum cras, fuge quaerere, et
Quem Fors dierum cunque dabit, lucro
Appone."

And again:

"Carpe diem quam minimum credula postero."

And did the Fates smile not over-propitiously on him, his easy-going philosophy came to his rescue with—

"Durum sed levius fit patientia."

His advice to Dellius was the ruling principle of his own life—

"Aequam memento rebus in arduis,
Servare mentem, non secus in bonis
Ab insolenti temperatam
Laetitia."

In modern English, "Observe the golden mean."

"Auream quisquis mediocritatem
Diligit, tutus caret obsoleti
Sordibus tecti, caret invidenda
Sobrius aula."

It is always right—the old Latin Delectus. "In medio tutissimus ibis." Does not even the negro comedian of the music hall re-echo it—"Keep in de middle ob de road"?

And now the Fiscal question is on us! Yet once more, is it not right, "In medio tutissimus ibis"?

Space does not permit, which even if it did, the game were not more than worth the candle, to examine into the three great problems of Humanity as they were known to and touched upon by Horace—God, Duty, and Immortality.

He undoubtedly shared in the belief, general among all men of high culture of his age, of a life beyond.

"Sunt aliquid manes," says Propertius; and here Horace is at one with his brother poet. Such a phrase as "pulvis et umbra sumus" is wrongly advanced to prove Horace a believer in the "thanatism" of the nineteenth-century Ernst Haeckel.

Pulvis et umbra sumus: perhaps: and yet *non omnis moriar.* But after all, what does it matter? *Cui bono?* To pursue the theme were to miss the true Horatian spirit. The hours and the minutes fall through; and it is better to observe, as page after page passes between your thumb and finger, the recurring *Horatii curiosa felicitas.*

"Edi nunc satis atque bibi,
Tempus mihi dormire est."

The *varia lectio* is, we think, pardonable. So, as Evelyn of Diary fame has it, "To bed," to be lulled to sleep by the Song of the River beneath your window on its way from its cradle in an upland tarn to its grave in the Solway Sea.

SOME IMPRESSIONS OF NORWEGIAN SCHOOLS.

WE were steaming slowly up a lovely fjord on the south coast of Norway, and right ahead, on the summit of a pine-clad hill, one could see a large, imposing-looking building. "That," said my companion in answer to my query, "is the village school."

Truly the light of education is not hidden under a bushel there, nor is it put on one side as something to be half ashamed of. Go where you will in Norway, you find the school building placed in the sunniest, healthiest part of the town or village. That fact is typical of the nation's attitude towards education in general. Although a poor country, Norway has built for herself one of the finest educational systems in the world.

A visit to an ordinary village school is somewhat of a revelation to most of us. You are surprised at the size of the building, its light, airy rooms, at its appointments and fittings. Let me take one village as an illustration.

Langesund is a lovely village on a sound of the same name at the entrance to the fjord leading up to Skien. Most of the inhabitants are engaged in fishing. Many of them have sailed the world over in timber boats, and I found no fewer than ten retired master mariners in that place of 300 inhabitants. Now every Norwegian sailor who has got his certificate speaks English, and it is therefore not surprising that the children in this town, as in most of the places in Norway, are especially anxious to learn English.

No better illustration of the democratic ideas of these people could be found than in Langesund. There the clergyman's daughter sits in school side by side with a poor fisherman's daughter, and—what to us seems more remarkable perhaps—the parson himself teaches regularly in the school.

There is only one school in the town, and rich and poor alike attend. The upper standards constitute a kind of Higher Grade School, and there the more ambitious children are prepared for the Middle School Examination, which last is almost a *sine quâ non* for the future business man or woman.

The school consists of two substantial two-storied buildings of wood, standing at the top of a hill, perhaps 200 feet above the harbour. The chief objection to these wooden buildings is that they are very noisy. In other respects they are excellent. The walls are thick, and the heating and ventilation both seem admirable. I have visited many schools both in summer—when it is often very hot—and in winter, when they sometimes get from thirty to forty degrees of frost, and very rarely indeed did one find a stuffy class-room.

Owing to the elaborate precautions taken, the danger of fire is not as great as might at first be supposed. "Fire drill" is practised, however, for of course in a land of wooden houses, fire is a thing very much dreaded.

The head of this school is the vicar of the parish. He is also chairman of the management committee—a kind of School Board—and he also teaches English and German in the upper classes. His position is therefore a very curious one. His appointment to the living depends to a large extent upon his qualifications as a schoolmaster.

Since, in Norway, children are not obliged to attend school before reaching the age of seven, there is no infant school. No doubt the severity of the Norwegian winter is in part responsible, but there is also amongst the people a firmly-rooted objection to kindergarten systems and early schooling of any kind.

The school hours are from eight in the morning until two in the afternoon, on *six* days of the week. This sounds rather startling at first, but, it should be noticed, an hour's lesson really means only three quarters'. Between each lesson and the next there is an interval of fifteen minutes for recreation—in summer in the playground, in winter in a gymnasium—so that the strain upon teacher and taught is not as great as might be imagined.

There is a well-fitted workshop attached to the premises, and there a modified form of the Slojd System is taught to the older boys.

In the winter months, when the snow lies on the ground, the boys and girls take their kjælke (a kind of toboggan) to school, and when lessons are over for the day, they mount their vehicle and glide merrily down the hill. The more daring put on their skis (pronounced shes) and go off into the woods. In fact, it would be difficult to find a merrier, hardier, healthier lot of children, go where you will.

Appended is a specimen time-table analysis, as arranged in most rural municipalities.

Analysis of Time-Table generally adopted by the Education Authorities for Elementary Schools throughout Norway.

1. For very tiny schools, where the teacher travels from one hamlet to another.
2. For very small permanent village schools.
3. Larger village schools.
4. Large village and town schools.

Subjects.	Undivided School.		School with Two Classes.		School with Three Classes.			Schools with several Classes. (An ordinary village school.)				
								1st Division.		2nd Division.		
	1st Division.	2nd Division.	1st Class.	2nd Class.	1st.	2nd.	3rd.	1st.	2nd.	3rd.	4th.	5th.
Religion	8	9	7	7½	7	7	7	7	7	7	7	7
Norwegian	8	7	8	7	8	7	7	10	8	7	7	7
Arithmetic	5	6	5	6	5	6	6	4	5	5	5	6
Geography	2	2	3	2	3	2	2	2	3	2	2	2
History		2		2		2	2			2	2	2
Elementary Science		2		2		2	2			2	2	2
Writing	5	4	5	4	5	4	4	5	5	4	3	2
Singing	2	2	2	2	2	2	2	2	2	2	2	2
Manual Work	...	2	...	2	...	2	2	...	...	2	2	2
Drawing	...		...		...	...	2	...	...	1	2	2
Gymnastics	...		...	1½	...	2	2	...	..	2	2	2
Total periods per week of *six* days	30	36	30	36	30	36	36	30	30	36	36	36

N.B.—Each lesson lasts 45 minutes. Then there is a break of ¼-hour.

In the country the number of children in a class must not exceed thirty-five, and in towns fifty. In the country boys and girls are usually taught together, in the towns separately.

Education is free, but children are required to buy their own books. Very needy ones, however, receive all they need from the municipality. In Christiania, too, free meals are distributed, and last year something like 100,000 kroner was spent on that alone.

Town Education.

In the larger towns facilities for education are of course much better. Contrary to what one might expect, even in Christiania, the democratic spirit still prevails, and rich and poor alike may be found attending the town schools. There are several splendid Higher Grade Schools, and the "time sheet" typical of these is given on next page.

It is very noticeable here, as in the smaller towns, that a great deal of time is spent in language teaching. In the Borger og Realskole for instance, containing some 400 boys and girls, you observe that the children have from five to six lessons a week in German, and, in all but the first form, five lessons a week in English. That is, *ten hours a week* spent in modern (foreign) languages. General science and geography get two lessons a week, religion two, singing one.

In this particular school there is a staff of twenty-two, eighteen men and four women. The average teaching hours of each work out at about twenty hours a week.

Modern languages are taught on the most modern methods. The teaching of English, for instance, is extremely thorough. The Norwegians seem to have studied all the leading systems, and to have taken some of the best features from each in order to construct one for themselves.

The teaching is almost entirely conversational. After the children have read a short passage from their text-book simultaneously and individually, the teacher asks a number of questions on the subject-matter, grammar, &c. These the children answer—

Analysis of Time Table in Use in a very large Girls' Secondary School in Christiania.

Subject.	1st Class.	2nd Class.	3rd Class.	4th Class.	5th Class.	6th Class.	7th Class.	8th Class.	9th Class.	10th Class.	Class for Middle School Examination.
Religion	2	2	2	2	2	2	2	2	2	1	2
Norwegian	6	9	7	7	6	5	4	4	3	3	3
Swedish	...	...	...	..	...	...	...	...		1	...
History	...	...	3	3	3	3	2	2	2	2	3
Geography	...	2	2	2	2	2	2	2	2	1	2
Natural History	...	...	...	1	1	2	2	2	1	...	2
Hygiene	...	...	...	..	...	...	...	...	...	1	...
Physics	...	...	...	...	...	...	...	...	1	1	2
Mathematics	4	4	4	4	4	3	3	5	6	4	5
German	...	...	...	...	...	5	4	4	4	3	4
French	...	...	...	...	...	...	...	...	3	2	2
English	...	...	...	...	...	...	5	4	4	3	4
Drawing	...	...	1	2	2	2	2	2	2	2	2
Writing	4	3	2	2	2	1	1	1	...	...	1
Needlework	4	4	4	4	4	3	3	2	2	2	...
Gymnastics	...	...	2	2	3	3	2	2	...	...	...
Singing	...	...	...	...	1	1	1	1	1	1	...
Cookery	...	...	...	...	...	..	...	...	...	3	...
	20	24	27	29	30	32	33	33	33	30	32

Analysis of Time-Table used in large Mixed School (Secondary), corresponding to a Higher Grade School here.

Class.	Religion.	Norwegian.	German.	English.	History.	Geography.	Nature Study.	Mathematics.	Drawing.	Writing.	Gymnastics.	Needlework or Woodwork.	Singing.
IVa.	1	4	5	5	3	2	3	5	2	...	4	2+2 / +2	...
IVb.	1	4	5	5	3	2	3	5	2	...			...
IIIa.	2	4	5	5	3	2	2	5	2	...	3	2+2	1
IIIb.	2	4	5	5	3	2	2	5	2	...		2+2	
IIa.	2	4	5	5	2	2	2	5	2	1	3	2+2	1
IIb.	2	4	5	5	2	2	2	5	2	1		2+2	1
IIc.	2	4	5	5	2	2+2 (p) (g)	2	5	2	1	3 (g) + (p)	2 (g) + 2 (g) + 2 (p)	1 (g)
IId.	2	4	5	5	2		2	5	2	1			
IIe.	2	4	5	5	2	2+2 (p) (g)	2	5	2	1		2 (g) + 2 (p)	+1 (p)
Ia.	2	5	6	...	3	2	3	5	2	2	3	2+2	1
Ib.	2	5	6	...	3	2	3	5	2	2		2+2	1
Ic.	2	5	6	...	3	2	3	5	2	2+2 (p) (g)	3 (g) + 3 (p)	2 (g) + 2 (g) + 2 (p)	1 (g)
Id.	2	5	6	...	3	2	3	5	2				
Ie.	2	5	6	...	3	2	3	5	2			2 (g) + 2 (p)	+1 (p)

(*g*) Lessons marked thus are for boys.
(*p*) Lessons marked thus are for girls.

except in rare cases—in *English*. Perhaps the best idea of the thorough nature of modern language teaching there may be gathered from the examination test set at the Middle School examination. This is as follows:—

The examiner reads to the candidates a short story in *English* two or three times. The children are then required to reproduce this story *in English*.

This is the kind of passage set for the Middle School Examination in English. The children have to reproduce this passage, in English, after hearing it read:—

ENGELSK GJENFORTÆLLING:

A Faithful Dog.

A French peasant was riding home one evening, followed by his dog. He had been to town to sell a considerable quantity of corn, and having settled the business he had bought a few presents for his wife and children, and put them, with the money, in a bag which he now carried with him, tied to the *saddle*.

However, after some time the bag *slipped* out of the rope that held it, and fell to the ground, without the owner being aware of it.

When the dog saw the bag lying by the wayside he ran after his master and barking and *howling* tried to inform him that there was something wrong. But the peasant did not understand these signs; and then the dog, barking still more furiously, began jumping at the head of the horse and biting its mouth and throat.

The horse got frightened and very nearly threw its rider; whereupon the peasant, who thought the dog must have gone mad, drew out a pistol and fired a shot at him. As he was unable to bear the sight of the wounded beast he then spurred his horse and rode on. "Poor dog," he thought, "I had rather have lost any sum of money than such a good friend!" But a moment afterwards, when he looked for the bag, he discovered that it was gone. Now he understood what a terrible mistake he had made, and turned his horse round; but neither the dog nor the bag was to be seen.

There were, however, marks of blood on the road, and following these he at last reached the spot where

the bag had been dropped. There it still lay, with the faithful dog watching beside it.

When he saw his master he feebly wagged his tail. Then he drew a deep sigh, and died.

To slip = at glide.
To howl = at hyle.
Saddle = sadel.

Remembering that the story is read in a foreign language, and written in a foreign language, it will be seen how difficult this is. Yet so thorough is the teaching, that comparatively few fail to pass this test.

Christiania possesses several excellent private schools, some of which are subsidised by the State. Olaf Berg's Girls' School is a splendid institution, and provides an almost ideal education for girls between the ages of seven to eighteen.

In fact the difficult problem of girl education has been solved very successfully in Norway. The scholars are well taught, encouraged to think for themselves, and every endeavour is made to provide those who wish with a sound liberal education. The subjects of instruction include English, German, French, mathematics, general history (this consists of stories from the world's history, to illustrate the rise, progress, and fall of the great nations), geography, drawing, and botany. There is also a cookery school, and in a well-appointed kitchen the girls are instructed in the art of preparing fish-pudding and other gastronomical delights. On the occasion of our visit—last September—the girls had prepared a complete dinner, and with great pride invited some of the mistresses to the banquet.

Some years ago, when the emancipation of women problem threatened to convulse Norwegian society, the fair maids thought scorn of the domestic arts. But a reaction set in, and now girls in all ranks of society, whether they may have to use them afterwards or not, learn cookery and general household management. There are several excellent schools for this purpose in the town, and it happens quite commonly that the next news, after that of an engagement, is that the happy fiancée is off for three months' training at the Kok Skole, where she will spend four hours a day for six days of the week learning the mysteries of the kitchen.

A few facts and figures concerning Norwegian education, primary and secondary, may be of interest to some of our readers.

1. Ambulatory schools, such as one reads of in geography books, are steadily disappearing. In 1837 92 per cent. of the children attending school in the country were taught by a "wandering" schoolmaster. Now it is less than 2 per cent.

2. Education is attended with many difficulties in the country districts. Over 10 per cent. of the children have to go more than two miles to school. Many are compelled to go in boats.

3. All teachers must belong to the Established Church, and must have passed a teacher's examination. There are ten training colleges, and the course generally lasts two years. The teaching there, as at the university, is quite free.

4. Norway is a poor country, but of late years the Government has voted 10,000 kroner towards travelling scholarships for primary teachers. Many come to England to study English.

5. The average salary for country teachers is about £45, being rather more for men and less for women. The master generally gets in addition a house, pasturage for two cows, and a garden. A very large number of country schoolmasters also act as parish clerk. For this they receive about £10 a year. (It should be remembered that £45 in Norway represents a much larger sum in England.)

6. In 1895 the education of each primary school child in the country cost £1, 2s., and in the towns about £2, 10s.

7. The masters in secondary schools, who as a rule possess a degree, receive something like £125 per annum, rising to £200. A great many of the teachers in such schools have received training.

SOME ANCIENT LEGAL CUSTOMS: ORDEAL AND SANCTUARY.

AFTER the introduction of Christianity among the English, there arose certain methods of criminal trial which were actuated by the principle that, while they were being carried out, Divine Providence would intervene to protect the innocent person, or to point its finger at the real culprit. The process undergone by the accused was known as "the Ordeal," and this in its first stage was of two kinds, that by fire and that by water, the former being set apart for the higher ranks of society.

Usually, in the ordeal by fire, the man or woman against whom the charge had been made was required to walk, blindfolded and with naked feet, over nine red-hot ploughshares placed lengthways at uneven distances, often on the floor of a church. The feet were then bound up and were kept so for three days. If, on the expiration of that time, the flesh were discovered to be unharmed, it was assumed that the accused person was innocent; if otherwise, he was deemed guilty. Another form of the fire ordeal was the thrusting of the hand into a heated iron gauntlet.

In the case of the ordeal by water the accused was bound hand and foot and cast into a pond or river. If he floated on the surface he was pronounced guilty, but if he sank, that was regarded as the proof of innocence, and he was hauled out of the water by the rope that had been previously tied around his waist, and was allowed to go his way, damp, yet rejoicing.

Sometimes the ordeal was by *boiling* water; in this case the accused person would be called upon to plunge his arm into a vessel of hot water and bring out a stone that had been placed therein. The subsequent procedure was similar to that observed in the case of the fire ordeal.

In cases of murder the process known as "ordeal by bier" was sometimes used; here the accused was requested to touch the body of the victim; and it was supposed that the contact of the real murderer would cause the blood to flow out anew from the wounds. Shakespeare, in his *Richard III.*, makes the body of Henry VI. bleed in the presence of Gloucester, his slayer, on which the widowed queen, Margaret, exclaims—

> "O gentlemen, see, see! dead Henry's wounds
> Open their congeal'd mouths and bleed afresh."

Another form of divination was the "ordeal by lot," whereby the fate of the accused rested upon the turning up, or not, of a cross marked upon a face of one of the two ivory cubes that were thrown.

A method of divination largely in vogue among the Saxons was that of the *corsned*, or morsel of execration.

A piece of bread, or of cheese, which had been consecrated according to a particular form, was given to the defendant to swallow. This, in a guilty person, was expected to cause choking and convulsions, but in an innocent person it would find a ready passage into the stomach. A remnant of this custom lies in the vulgar expressions, "May this choke me!" "May this morsel be my last!" and the like, used by a person when asserting the truthfulness of what he is saying, or his innocence of an imputed offence. An account, purely legendary, of the death of Earl Godwin relates that while dining at the royal table he was accused by Edward the Confessor of the murder of the King's brother. The Earl indignantly denied the charge, and, taking up a piece of bread, said, "May this choke me if I had aught to do with his death." So saying, he put the bread into his mouth, but in the attempt to swallow it he was choked, and he fell dead under the table.

The Trial by Battle, or Single Combat, was another instance of the resorting to Divine aid in order that innocence might be vindicated and guilt pointed out. It was presumed that in the combat, victory would surely fall to the injured or falsely accused party. (This method of appeal was also used in early times for the settlement of matters concerning disputed possession of land.) The challenge was given by the act of throwing down a gauntlet, and was accepted by the taking up of this token. In certain cases the combat could be fought by champions instead of the persons immediately concerned.

On entering the lists each combatant made oath, the one that the accusation he had uttered was just and true, and the other that he was innocent of the charge brought against him. Each then made a solemn declaration that he had about him no amulet, or other article of witchcraft or sorcery, to influence unlawfully the result of the fray. The fight was to last from sunrise until the stars came out in the evening, and if the accused maintained the combat until that time, or if before it he became the victor, he was acquitted; if, however, he was vanquished, or he yielded, he was deemed guilty, and he suffered the due punishment. If a combatant were killed during the battle, the death was accounted a sign that the Deity Himself had wrought justice upon the guilty man.

The Trial by Wager of Battle was claimed in this country as near to our own times as the year 1818. One Abraham Thornton was under trial in the Court of King's Bench for the murder of Mary Ashford, at Erdington, near Birmingham, the prosecution being undertaken by the murdered woman's brother. When called upon to enter his plea the prisoner replied—"Not guilty, and I am ready to defend the same with my body," and so saying, he threw down a gauntlet, the fellow of one which he was wearing. After much discussion it was settled that Thornton was entitled to his wager of battle, but as he was a tall and athletic man, and the appellant a mere boy, there is little wonder that the combat was declined. The accused man was therefore discharged from custody, but he was the last who ever took advantage of this archaic custom, for the law was repealed in the following year.

Taking Sanctuary was a means by which a guilty person could render himself secure from arrest for a certain time. A sanctuary was an asylum so privileged that one who had taken shelter therein could not be removed without sacrilege. Sanctuary was accorded in a place of worship, but, in certain instances, its extent was so increased as to include the whole town in which the church stood, as, for example, Hexham.

The formalities that were observed in connection with taking sanctuary varied somewhat in different places; the procedure cited here was that followed at Durham Cathedral. The fugitive knocked at the door of the Galilee or great west porch (the "sanctuary knocker" yet remains here), and those who opened the door to him rang the Galilee bell to announce that one had taken refuge there. He was then clothed in a gown of black cloth with a yellow cross on the shoulder. The coroner was sent for, and to him the refugee gave his name and the particulars of his offence.

The period of sanctuary was forty days, after which no one could legally supply the man with food. Before the expiration of that time, however, he was given the option of leaving the country for good. If he accepted this, he was ordered to go by the most direct road to the nearest seaport, and there ship himself to some foreign country. A crucifix was given him to carry, as a sign that he was under protection, and as a warning that no one could interfere with him without committing sacrilege. If he returned from beyond the seas without the king's permission he would incur the penalty of outlawry. The privilege of sanctuary was abolished by Act of Parliament in the 21st year of James I.

THE TRAINING OF TEACHERS IN SCOTLAND.

THE Committee of Council on Education in Scotland has issued a very important Minute dealing with the control of the Training Colleges by the Universities. The University of London will this year open a Training College for 400 or 500 students in the South of London, and it is quite possible that the plan for connecting the Scotch Training Colleges with the Universities may be the forerunner of a similar scheme for English Training Colleges.

The following are the clauses of the Minute:—

I. That there shall be established in connection with the Universities of St. Andrews, Glasgow, Aberdeen, and Edinburgh respectively, a Committee for the Training of Teachers, these Committees to be constituted in the manner prescribed in the schedule to this Minute.

II. Each Committee shall appoint their own Chairman, and fix their own quorum, and may delegate such parts of their duties as they may see fit to Sub-Committees composed of members of their own body with or without added members as may seem to the said Committee to be advisable.

III. Each Committee shall have power to provide, whether in University Classes or otherwise, courses of instruction suitable for the training of teachers (including teachers for Secondary Schools). These courses may include, if the Committee so determine, instruction in religious subjects. They shall be held in towns where a University or a part of a University is situated, but the Committee shall also have power to institute, with the consent of the Department, subsidiary courses of training at approved centres in connection with either a Secondary or a Higher Grade School.

IV. Each Committee shall further have power to acquire by purchase, or to secure by lease, suitable premises for the purpose of the aforesaid training, and to provide the necessary apparatus and equipment. A Committee may also establish or may subsidise on such conditions as may be agreed upon, subject to the approval of the Department, one or more hostels for the residence of the students under their charge, and may make such maintenance allowances to individual students as may be deemed necessary. But each student who receives such assistance shall be taken bound to render service in such class of schools and for such periods as may be from time to time prescribed by the said Committee.

V. Each Committee may receive for training upon such terms and conditions as to payment of fees or otherwise as may be deemed expedient by the said Committee any persons who are duly qualified according to the regulations of the Department for the time being.

VI. Each Committee shall have power to appoint officers at suitable salaries either for purposes of instruction or of discipline, and to prescribe courses of studies for the students collectively or for individual students, as well as to make regulations for the proper behaviour and conduct of the students.

VII. It shall be a condition of Parliamentary Grant to any School Board, or of a grant under any Minute of the Department to any endowed school, that the School Board or the Governors, as the case may be, shall grant to the Committees instituted under this Minute such access to their schools and such facilities for practice in teaching as may be agreed upon or as may, if necessary, be determined by the Department, who shall also determine what payment shall be made for the use of such schools.

VIII. From and after the 31st July, 1905, grants for the training of King's Students shall cease to be payable to the existing local King's Studentship Committees, but the Committees constituted under this Minute shall come in place of the said local Committees as regards any responsibilities undertaken by the said local Committees towards Students in training, or towards officers employed in their instruction, and for that purpose each of the Committees now constituted shall receive from the corresponding local Committee any balance of funds derived from the grants of the Department remaining in the hands of the said local Committee at the said date.

IX. In the event of the body of management of any existing Training College or Colleges resolving to demit its powers of management in favour of any of the Committees constituted under this Minute, and to transfer to the said Committee the College premises and equipment, the Committee shall have power to receive the same, and to pay therefor such purchase money or annual rent as may be agreed upon, provided always that no payment shall be made for the purchase or rent of any premises which are held in trust by the said body of management for the purpose of training teachers.

X. In the event of any such transference, the Committee shall be bound to take over the existing staff of the Training College or Colleges concerned on the terms of their present engagements, but shall be at liberty to dispense with the services of any officer upon giving due notice, provided always that in the event of its being resolved to dispense with the services of any officer who has been employed on the staff of any College for a period of ten years or over, the Committee shall be bound to grant him such pension or retiring allowance as he might reasonably have looked for had he continued in the service of the transferring body of management.

XI. When a Training College so transferred is the property of, or is held in trust by, the representatives of any Church or religious denomination, it shall be a condition of such transference that provision shall be made therein for religious instruction in accordance with the views of the said Church or denomination, to an extent not less than that which is at present customary in the College so transferred, which instruction may either be provided by the accepting Committee or the transferring Church or denomination as may be agreed between them, and further, where the accepting Committee undertake to provide such instruction on their own behalf, it shall be a condition that they also undertake to afford adequate facilities for the periodical inspection of the said instruction by duly accredited representatives of the transferring Church or denomination under conditions to be determined by the Department.

XII. Where a Training College is transferred as set forth in the preceding section, the accepting Committee shall co-opt, as fully privileged members, representatives of the said Church or denomination, as provided in the annexed Schedule.

XIII. Each local Committee shall appoint an executive officer, who, subject to the instructions of the Committee, shall discharge the functions of Director of Studies, and who, with such assistance as may be necessary, shall be responsible to the Committee for the due observance of the Committee's regulations as to the conduct of the students.

XIV. The Committee shall receive such grants as may be allowed by the Code in respect of students who fulfil the conditions prescribed by the Code for the receipt of Parliamentary grants for the training of teachers (Articles 83–99 of the Code). Such further sum as may be required to balance the expenditure approved by the Department shall be provided from the balance of the grant remaining undistributed under Article 3 of their Lordships' Minute of 25th April, 1904. (See Appendix to this Minute.)

XV. Before the 1st October in each year or such other date as the Department may from time to time determine, each Committee shall submit to the Department an estimate of their expenditure, whether capital or other, for the next financial year, and no expenditure shall be incurred by the Committee till that estimate has been approved by the Department, nor shall any expenditure in excess of that estimate be incurred without the previous sanction of the Department.

XVI. So long as this Minute shall remain in force, members appointed or elected to serve on the several Committees under the provisions of the respective divisions of the annexed Schedule shall remain in office until such date as is fixed by the Department for the appointment and election of new Committees, provided that new Committees shall, so far as practicable and convenient, be appointed and elected once, and not oftener than once in every three years. Any casual vacancy caused by the death or resignation of any member shall be filled up according to the tenour of the respective divisions of the annexed Schedule by the body or bodies who appoint or elect such member.

XVII. The powers of the Committees under this Minute shall be exercised subject to regulations prescribed by the Department, and laid upon the table of both Houses of Parliament.

XVIII. This Minute shall not come into force till it shall have been submitted to Parliament, and shall have lain on the table of both Houses for at least one calendar month, and all modifications of the same which may be proposed subsequently shall be submitted to Parliament in like manner.

Then follows a Schedule giving particulars of the constitution of the respective Committees for St. Andrews, Glasgow, Aberdeen, and Edinburgh.

A WELL-KNOWN SCIENCE TEACHER: THE LATE JOHN HOWARD, F.C.S.

THE study of elementary science is all but universally recognised as a part of a liberal education, and vast sums of public money are now being expended on the teaching of science. The work has

indeed now become so colossal that we are apt to forget the work done by the pioneers of the movement. We are reminded of the debt we owe to those who laboured in the field by the passing away of one who numbers many of his former students and pupils among the readers of the *Practical Teacher*, indeed he was a fairly frequent contributor to the magazine himself,—Mr. John Howard, F.C.S.

Mr. Howard was born in 1832, and received his early education in one of the private schools of those days, which we are apt to look down upon as a class, but which included some like the one kept by Mr. Nicholson, a man who knew how to give his boys a taste for learning.

Instead of entering into business, as his parents had intended he should, young Howard found such great delight in study, and made such remarkable progress at the lectures and classes which he attended, including those given at University College and the School of Mines, that he decided to become a teacher. He studied music under Dr. Hullah, whose efforts to popularise the teaching of music made such a stir in the fifties. Mr. Howard disappointed his teacher, however, by turning his attention to the Tonic Sol-fa notation, and becoming a member of the committee of the old Tonic Sol-fa Association. But herein he showed his determination not only to study his subject but to become acquainted with the best methods of teaching it.

In 1852 his love of teaching, and the necessity of adopting a means of livelihood, led him to open a school on his own account. This was the Islington School of Science and Art in Windsor Street, Essex Road, N. He declared that his purpose was to give "the sons of tradesmen, artisans, and others, a sound English education of the highest character," and those of his former pupils whom we have met join in saying how admirably this purpose was carried out.

His curriculum included science, and for this subject he had a marked predilection. He opened the school with twenty boys; in three months he had seventy, and in a short time the numbers increased to two hundred.

Like every true teacher, Mr. Howard was very anxious to learn, and he was among the most enthusiastic of the students at the courses arranged by the new Science and Art Department for the training of science teachers. These included lectures by Professor Huxley and Dr. Hofmann on "How to teach Chemistry, Physiology, and Biology," and later on the services of Professor Tyndall and Dr. Frankland were secured for lectures on Physics and Chemistry. At these lectures Mr. Howard was a most assiduous student, and he devoted much of his midsummer holiday time to laboratory work at South Kensington.

He established classes in connection with South Kensington as early as 1861, and his pupils attained phenomenal success, and the returns show that in the first fifteen years his pupils carried off seven gold, three silver, and seven bronze medals, over 1300 Queen's Prizes, besides certificates, and four Royal Exhibitions.

The Clothworkers' Company, in recognition of the earnest work done, made a grant for refitting the laboratory. The school, however, felt the competition of the well-equipped Board schools that were springing up around it, as well as that of the Haberdashers' School, and of Owen's School, both supported by wealthy City companies, and towards the end of 1888 it was closed.

But Mr. Howard had been pressed to undertake other work in the time that he could spare from his school. In 1879 he was appointed science master at Borough Road Training College, and superintended the fitting up of the laboratory for practical work. This post he held as long as the college remained at Borough Road, and when the college removed to Isleworth Mr. Howard designed and fitted up the laboratories in the new buildings.

From October 1883, Mr. Howard was engaged as lecturer on Chemistry and Physics at the City of London College, where his classes were largely attended and highly successful.

In spite of the small amount of spare time left after his various classes, Mr. Howard managed to find time to write a manual of practical chemistry, to prepare a

series of chemical diagrams and pamphlets, as well as to contribute occasional articles to the magazines.

About twelve years ago his frequent attacks of bronchitis compelled him to give up all his teaching engagements, and he has lived in retirement chiefly at Folkestone. During this time he has done a little literary work, and shown a keen interest in everything that was connected with scientific teaching, and found immense pleasure in following the remarkable scientific discoveries of the last decade. Sad to relate, during the last eighteen months his general health failed considerably, and a double cataract deprived him of the pleasure of reading his beloved books and papers. About Christmas he appeared better in health than he had been for a long time, but pneumonia followed a chill, and he passed away on January 23. We feel that the earnest work of such a man produces its effect in ever-widening circles long after he himself has sunk to rest.

EDUCATION IN SOUTH AFRICA

A STUDY of educational methods and work in countries other than our own must always be of interest to those to whom a country's prosperity is a matter of importance, since the prosperity of any country depends primarily on the education of its citizens.

England is awakening to this fact; she realises that it is not sufficient that the state should make itself responsible for the proper education of one section of the community only, and that the poorer section, but that she must be responsible too for the education of all other sections of the community, by, on the one hand, providing proper education at the expense of the state entirely, and on the other by aiding and supplementing individual educational effort and private educational enterprise. The work of the teacher is no longer looked down upon in this country, rather is it being more and more recognised as an integral part of the work of the state.

This fact was brought prominently forward during the South African Boer war of 1898–1902, when England not only sent out soldiers to fight her battles, and nurses to tend her sick, but also teachers to educate the children not merely of the colonists but of the Boers too. The enthusiasm and patriotism which led so many teachers to offer themselves during the war for the concentration camp schools has not died out. Since peace was declared others have offered themselves for work in the newly established town and farm schools.

There is always a ready and free response to any appeal for teachers to work in the different parts of South Africa, and for many a long year to come we shall want home-trained teachers to help us in our work. I have had between four and five years' experience inspecting schools, first for the Education Department of Cape Colony and then for the Education Department of the Transvaal, and have also visited (unofficially) schools both in the Orange River Colony and in Natal, and hope shortly to return to my work in the Transvaal. so that I feel I can speak with some considerable experimental knowledge of the education work going on in South Africa to-day. Possibly some who read these articles may be inspired to come out and help us in our work, and others may be deterred from offering themselves for the work by realising their unfitness and so may be saved disappointment, and we in the department may be spared the expense and trouble of correspondence with and arranging to bring out teachers who are unsuitable for our work. I propose therefore to write a series of short articles in the *Practical Teacher* somewhat as follows:—

1. On the education work generally of South Africa, and what, broadly speaking, are the qualifications—academic, professional, and personal—for making successful teachers out there.

2. Upon the educational system of Cape Colony, the classification of its schools, school examinations and inspections, and the social and domestic life of teachers.

3. Upon the educational system of the Transvaal, upon the different classes of schools, town, mine, and farm schools, school inspections and examinations, teachers' qualifications, school and home life in the Transvaal.

4. My impressions of educational work in the Orange River Colony and in Natal.

I. A General Survey of Education Work in South Africa.

The Qualifications—Academic, Professional, and Personal—which make the Successful Teacher in South Africa.

The education work of South Africa is carried on by five separate departments corresponding with the five chief divisions of South Africa, viz: 1. Cape Colony. 2. Natal. 3. Rhodesia. 4. Orange River Colony. 5. Transvaal.

At the head of each department there is a Director of Education, who is supreme in his own department and works independently of the other heads, although there are meetings and conferences on educational matters from time to time.

1. The Education Department of Cape Colony is under Dr. Muir, who is officially known as the Superintendent-General of Education. His head office is at Cape Town.

2. The Education Department of Natal is under Mr. Mudie, the Superintendent of Education. He has only held office since the autumn, succeeding Mr. P. A. Barnett, who has returned to England lately, after two years' invaluable work in Natal, to resume his educational work here as Inspector of Training Colleges. The Natal Education Office is at Pietermaritzburg.

3. The Education Department of Rhodesia has for its chief Mr. Duthie. The Education Office is at Salisbury.

4. In the two new colonies we have Mr. E. B. Sargant, who acts as Educational Adviser to Lord Milner. His position is that of Minister of Education, and his headquarters are in Johannesburg.

5. The Transvaal Education Department has Mr. Fabian Ware as its Director. The chief office is at Pretoria. There is also a branch office at Johannesburg presided over by Mr. E. T. Ligertwood, the Superintendent of Johannesburg and Rand Schools. In the Orange River Colony Mr. Gunn is the Director of Education. The Education Office is at Bloemfontein.

Each education department has its own staff of office officials, inspectors, &c. Application for work in any particular part of South Africa should be made direct to the head of the department.

Each colony has its own education code and special school system. I shall speak more fully on these points

when I write on the work done in each separate colony.

The qualifications for teachers seeking work under any one of the afore-named Departments of Public Education in South Africa are as rigidly enforced as at home, possibly even more so. The idea that there is such a demand for teachers in our new colonies that private governesses, or men and women who have only received a fair general education, can easily obtain work is quite an erroneous one. Apart from certain academic qualifications such as holding school examination certificates, like the Oxford and Cambridge Senior certificates and the London University Matriculation certificate, or the King's Scholarship, which imply that the holders of these certificates have received a good general education, all would-be teachers in government schools must hold some professional certificate as well, such as certificates testifying to the fact that the holders have undergone some definite training for the profession of teaching.

In Cape Colony a three years' pupil teachership, followed by obtaining a teacher's third or second class certificate, is necessary for all teachers not holding special training certificates from their own country.

In the Transvaal and Orange River Colony a course at the Government Normal College of one or more years is obligatory to qualify for work in a government school unless teachers already possess a training certificate from another country.

The whole tendency of the educational authorities is to make the preparation for teaching a distinctly serious matter, and year by year to raise the necessary general and special qualifications. The teacher's pay is very fair; on this point I shall speak more fully presently. There are, of course, openings for private governesses of a class, but the life of a private governess in a family, with some rare exceptions, is not a very enviable one, certainly not less difficult or more pleasant than a similar life at home, nor is the pay, as far as I have ascertained, at all on a liberal scale.

We will now consider what, speaking generally, are the personal qualifications which make for success. These personal qualifications may be classed as *good health* and *strong character*.

The climate of South Africa is distinctly trying, especially at first. The heat is exhausting, and the variableness of temperature, particularly noticeable in the Transvaal, is a source of distinct danger. Then the rainy season in Cape Colony, which occurs during the winter months, has its own special dangers, and the dry winters of the Transvaal, with their very unpleasant dust storms, all are danger-traps to the unwary and the fresh-comer.

So many people who come out to South Africa imagine they are coming to a land of perpetual sunshine and warmth, where fires are never needed. This is altogether a wrong idea; fires are needed in many parts every evening during the winter months, for although the middle of the day is often quite hot, the mornings and evenings are chilly, at times really cold. There is a noticeable drop in the temperature at sunset, which is the more dangerous since it is sudden. Then, too, among the Dutch people and among many of the old colonists the idea of a fire is scorned; they hold it to be unhealthy and luxurious, and when to this is added the fact that carpets and warm curtains are things rarely to be found in an ordinary home, it is easily understood that English women and men too suffer at first with the cold, and their suffering is accentuated if they are badly provided with warm clothing. A sealskin cape I took out with me and warm foot covering in the shape of good strong boots and warm stockings were among the most useful and prized articles in my wardrobe. To keep in really good health in South Africa, and to be proof against sudden climatic changes, I strongly advise wearing woollen clothing *always*, varying in texture according to the seasons. It is true that many delicate teachers at home who come out to South Africa become strong and more capable for work. The bright sunshine and open air life are conducive to health, but many teachers suffer and succumb to the climate who might be well if they took ordinary health precautions. Temperance of life is specially necessary. The absence of home life and comforts, as we understand them, tends to induce young teachers, in towns particularly, to an indiscriminate indulgence in teas at restaurants, and a too free use of fruits and ices at all hours; such indulgences are harmful here in England, doubly, trebly harmful in South Africa. Illness, expensive as it always is, is a very serious matter with us out there; hospitals are few and private nurses very costly, so that a sickly teacher is placed at a serious disadvantage. In most parts of South Africa—a few of the older towns are exceptions, of course—there is practically little, if any, system of sanitation. The ordinary sanitary arrangements common in every village at home are almost unknown, so that to keep in good health, cleanly and regular habits, cleanly persons and clothes, are urgent precautions as disease preventives. I have dwelt fully on these points because I have seen so much unnecessary trouble caused to school authorities, and unnecessary suffering for the individual teacher, from lack of sensible, reasonable living. It is absurd to think that because the sun shines very brightly, and life is mainly out of doors and a very free one, that we can dress and eat and sleep just as the passing fancy dictates, rather we all need to remember that the climate is so stimulating at times and depressing at others, that it exhausts and often lowers physical power, and that more common-sense health precautions are needed than at home rather than less. Given, however, average health and strength, then with sensible moderation in exercise, in pleasure, and in indulgence of the appetite, there is every prospect of a healthy and happy life for the teacher in South Africa.

Necessary as good health is, character is even more necessary.

Life in South Africa has many charms, its freedom and brightness are very attractive, and yet life out there exposes the teachers, and especially the female teachers, to many subtle temptations. The balance of life is very easily lost, pleasure seeking is apt to be placed quite above doing the daily duty thoroughly. The work the teacher has come out to do too often becomes a secondary consideration; "having a good time," "seeing life out there," as they say, is the primary consideration. Nowhere is a teacher's work more important for the welfare of the state than in South Africa. It is in the schools, and more particularly with the younger children, that something really can be done to lessen racial feeling and promote harmony and concord. The children come very readily to school, are as a rule eager to learn, and not difficult to control and discipline. Parents are much

influenced by the children, so that a true teacher's influence is very real and very far reaching. Thus it is easily understood how serious a matter it is for the state when the teachers in public or state schools, either by indifference or inattention to work, or by lightness of conduct, lose the respect of the parents and pupils, and so minimise, if they do not altogether obliterate, any teaching they may give during school hours. Strength of character, moral backbone, and "grit" are the characters and traits most conducive to real success.

In my subsequent articles, where I speak more fully of the teacher's social and domestic life, I shall hope to make what I have just said clearer and more reasonable than it may appear to the readers of this first article. A bright and cheerful temperament, readiness to meet difficulties and accommodate oneself to new and at times not very comfortable home surroundings, are distinct assets in the personal equipment, so to say, which make for success in the teacher's life. The educational work, as I shall try to show fully in subsequent articles, is distinctly difficult and at times very wearying, but it is also a very real work, offering untold opportunities to the enthusiastic and earnest teacher, and promising a rich reward hereafter.

OBITUARY NOTICE ON MADAME MICHAELIS.

BY ELINOR A. WELLDON.

H.M. Organising Inspectress of Infant Schools, Education Department, Transvaal, and Kindergarten Instructress, Education Department, Johannesburg.

ON Friday, December 30, 1904, there passed away at Rotherhithe, Sussex, at the ripe age of 70 years, Madame Emilie Michaelis.

The cause of true infant education has sustained a great loss by her death. A native of Botha, in Thuringia, a pupil of the Baroness von Bulöw, herself a pupil of Froebel's, as the short obituary in the *Times* of January 3, 1905, tells us, Madame Michaelis came over to England in 1874 as an exponent of Froebel's theory and practice in England. It was at Croydon I first made her acquaintance. I entered her Kindergarten Training College, 13 Dingwall Road, Croydon, as a student in September 1881. I only spent one year as a student under Madame Michaelis, but that year was a very important one in my life. The stimulus I received from daily contact with Madame Michaelis during that year, added to the valuable teaching she gave me in kindergarten methods, certainly altered the whole course of my life. I left Croydon in July 1882, and took a post as kindergarten mistress at the Cheltenham Ladies' College, under Miss Beale, remaining there as the Principal of the Cheltenham Ladies' College Kindergarten Training Department till July 1900, when I left to go to South Africa as Kindergarten Instructress to the Department of Public Education, Cape of Good Hope.

During the eighteen years I was at Cheltenham, it was my great privilege to see Madame Michaelis at least once a year, and sometimes oftener.

A kindly letter of farewell when I left for South Africa was the last time I heard from her. During the four and a half years I have been working in South Africa, the memory of Madame Michaelis' devotion and zeal for "the cause" has been constantly present with me. One of the greatest pleasures I looked forward to on my return was paying her a visit and talking over the work with her, but alas! she died ten days after I reached England, and the privilege of seeing her once more has been denied to me.

It may perhaps help some younger kindergarten teachers if I try and state briefly wherein Madame Michaelis' great influence over her old students lay.

I think, primarily, it lay in the deep and lasting impression she made on us as to what a true teacher's life should be. Madame Michaelis' was a life actuated by high ideals. Having once realised the importance of infant education, and seeing in Froebel's method a true education for little children, she gave herself, her life even, to starting and organising kindergarten schools and to training young teachers for these schools. Her devotion to her work, her zeal for the cause impressed me afresh each time we met. I can truthfully say I always came away from visiting her refreshed and invigorated. I am sure I did my work better after each visit, and I trust I passed on to my teachers and students some of the earnestness and zeal I had myself received.

Secondly, no one who knew Madame Michaelis, as we old students knew her, could fail to feel as we all felt, how *selfless* a life hers was. Her power of throwing herself into the work and interests of her old students was simply wonderful; she joyed, as only a really large-hearted good woman can, over our successes, sorrowed, as only a real mother can, over our failures, our lapses from all that was highest and best.

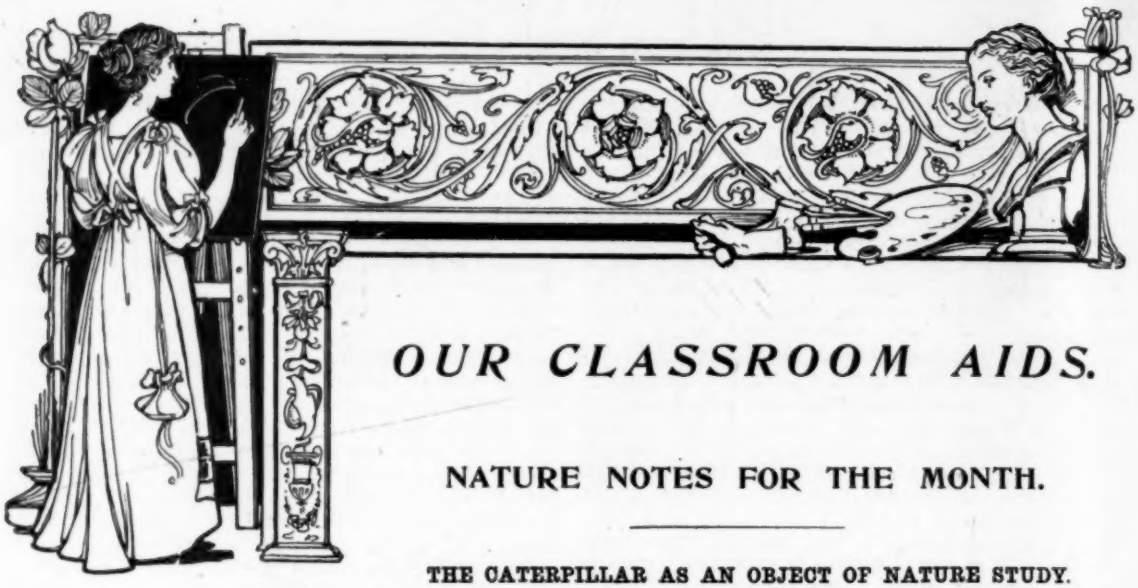
It was this remarkable power of throwing herself into our interests and sinking all personal interests which made her such a real friend and gave her such power and influence over us all.

Many an old student is sorrowing, as I am, at her death. There can, I am sure, be no better mark of our affection, nor of respect to her memory, than by trying to show in our work more of her devotion and zeal, and something of her large-hearted sympathy to our fellow-workers.

The world is the richer through lives like Madame Michaelis': characters like hers soften and leaven life. It is left to us to carry on her work here and in our colonies, and to let her spirit of devotion to work and true sympathy actuate our lives always.

WHAT IS ELECTRICITY?

THE most recent explanation of "electricity" is that of Sir Oliver J. Lodge, Principal of Birmingham University. Some time ago, when lecturing on Radium, he showed that electricity exists in small particles which we can in a manner "*see*" in the cathode or Crooke's Rays, and which are called electrons. These compose the atoms of matter. Atoms themselves are so minute that 300,000,000 can lie in a row side by side in the space of one inch, and there are a trillion of them in each granule of lycopodium dust. But "electrons," according to Sir Oliver Lodge, are very much more minute, for 100,000 can lie in the diameter of an atom, they being 1,000,000,000 times smaller in bulk than atoms are. Electrons are therefore proportional to atoms, as a grain of dust shot is to the dome of St. Paul's Cathedral, London.



OUR CLASSROOM AIDS.

NATURE NOTES FOR THE MONTH.

THE CATERPILLAR AS AN OBJECT OF NATURE STUDY.

THE small boy's fondness for collecting caterpillars is proverbial. At present he has no opportunity of indulging in his favourite pastime; but shortly, when the swelling buds on the lime-trees have burst, the instructor of youth will probably find his pupils deeply engrossed in discussing the wriggling contents of sundry old tins and matchboxes.

It is a great mistake to discourage the children in this hobby, for the average person has a great deal to learn from the humble caterpillar.

Most children have noticed the spotted Magpie moths which flutter around during summer evenings, but how many would connect these insects with the gaudy black and white caterpillars which they picked from the evergreens and currant bushes in May? Very few indeed.

If the schoolboys' captives are provided with board and lodging in the classroom, instead of being consigned to a premature death, they will amply repay the care bestowed upon them. There will be no lack of willing hands to supply the commissariat—the initial difficulty is the housing question.

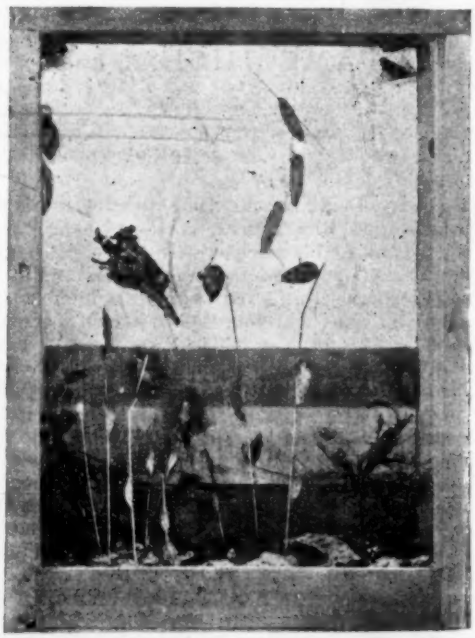
Rearing-cages of the orthodox pattern may be purchased at any naturalist's for sums ranging from half-a-crown upwards, but the amateur can easily turn out a better and more serviceable article for a quarter of the cost in a few hours. The instructions given below may appear somewhat complicated on paper, but in reality the process of construction is very simple.

The materials required are a flat box 12 inches by 10 inches by 3 inches high (an old chocolate-box was used in the case shown in our illustration), a long strip of white deal ½ inch square, 2 yards of muslin, and a sheet of glass cut to required size. First remove the lid and front of the box, taking care not to strain the remainder. If appearances are to be considered, the rough edges can be smoothed off with sandpaper, but this is not absolutely necessary for practical purposes.

We next saw four pieces 14 inches in length from the deal strip, cutting the edges as square as possible. These are the upright supports, two of which, A, A, are fixed snugly in the rear corners of the box by means of small nails. The other two, B, B, are similarly fixed 1 inch from the front of the open portion of the tray and parallel with A, A. (See sketch, p. 451.)

Four strips are now required for cross-pieces; two, C, C, are nine inches long, the other pair measure 12 inches.

Half-an-inch from the end of each strip, saw across at right angles to a depth of ¼ inch; "nick out" the resulting slab with a penknife and trim into shape. Next, place C, C horizontally on the ends of A, B with



BREEDING-CAGE WITH GLASS FRONT REMOVED SHOWING THE REMNANTS OF LAST SEASON'S STOCK.

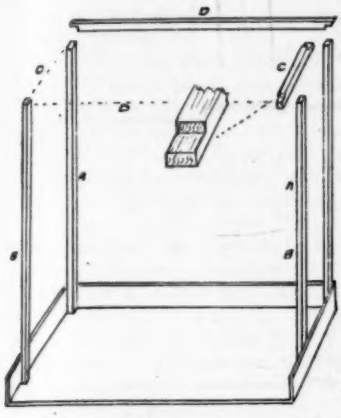
Photo by permission of the Stepney Borough Museum.

the notched surface upwards, and fix with a single brad at each end.

If the horizontals have been accurately cut, it will be found that when D, D are placed in position, notches downwards, as shown in sketch, the ends of the four strips will lock together neatly, forming a level framework; otherwise more trimming is necessary. D, D can be either glued or nailed as convenient.

The framework of the cage is now finished, and the next step is to cover the light skeleton with muslin.

The sides can each be covered separately, but a much neater and more effective method is to utilise two large pieces only, one for the top and back, the other for the top and sides. By reason of this simple arrangement the ceiling is composed of a double layer of material, which minimises the chances of dust falling into the interior of the cage.



The two strips should be cut rather large for reasons obvious hereafter. In the present specification the dimensions, 22 inches by 13 inches, and 37 inches by 10 inches respectively, will be found convenient.

Place the first piece roughly in position, the shorter edge slightly overlapping the front cross-piece, and the remainder of the strip passing over the angle at the back and hanging down in the rear, and fix the top fabric in place by means of pins lightly inserted into the framework.

The extra width of the gauze simplifies the operation by allowing the fringing edges to be pulled round the angles and pinned at the sides.

Gently draw down the curtain at the back and clamp the loose end against the top of the tray by means of a strip of wood tacked along the narrow edge which runs round the top of the tray. Pin as before.

Here and there the surface may be loose and puckered, but the irregularities can easily be corrected by judiciously shifting or adding more pins, and pulling the edges of the muslin adjacent to the faulty portion.

Though the pins are merely temporary agents to keep the fabric in position, they must not be disturbed when once the surface has been adjusted to satisfaction.

The permanent fixative is thin glue applied hot.

Brush the liquid on to the *exterior* of the muslin where the latter touches the framework, and rub the moist surface gently with the finger, taking care not to disturb the pins. The glue being thin, works through the muslin, and fixes it to the wood beneath. On the following day, when all is dry, the pins can be safely removed, and the loose and ragged edges of the fabric trimmed off with a sharp knife.

Top and back covered, the larger piece of material comprising the sides and extra ceiling layer is affixed in a precisely similar manner, and the main body of the cage is finished.

It now requires an efficient but simple door for the open front.

From the local cutter a sheet of glass $11\frac{7}{8}$ inches by 15 inches is procured.

Stand the glass in the box, upright against the front of B, B, and mark its position on the sides of the box with pencil lines.

Cut two more uprights similar to B, B, and after removing the glass, nail these close and parallel to B, B, as indicated by pencil marks. Add a cross-piece as before. If the new addition actually touches the main frame at the top, so much the better; it will then hold the glass firmer when the latter is inserted. However, there must be sufficient space at the bottom to allow the glass to rest securely on the floor of the tray.

On replacing the glass we have an efficient sliding door, which allows an uninterrupted view of the whole of the interior.

The tray at the bottom is for the reception of moss or damp sand, as the case may be; and in order to prevent particles of litter from getting beneath the edge of the glass, and so allowing the inmates to escape, a flat strip 1 inch in height is nailed across the bottom just behind the glass.

The cage is now finished and ready for the occupants.

Two such receptacles should be made—one for larvæ, the other for pupæ.

In the bottom of the first a layer of damp sand is placed, in the second, loam or garden mould covered with moss.

Stocking the Cage.

Throughout the winter most insects hybernate.

Those in the larval or caterpillar stage usually remain hidden until their particular food-plant becomes luxuriant. The immature larvæ of the Tiger moth occasionally venture out to feed on peeping herbage in the ditches; but usually the amateur will have to wait contentedly until the beginning of May before he can expect to find many larvæ.

In the meanwhile there is no reason why the pupa cage should remain idle; large numbers of chrysalides are snugly tucked away in odd corners, awaiting the return of the sun, and in most cases the perfect insects emerge early. Under fences and window-ledges the belted chrysalides of the Whites are to be found, and beneath the soil in the neighbourhood of tree roots, a judicious use of the trowel will reveal many a potential moth encased in a brown shell. Pupæ can also be purchased.

From experience I recommend Buff Tips, Poplar Hawks, and Emperors as reliable and early emergers. A few of each should be placed in the moss of the pupa cage.

From May onwards the larva cage will be in great demand.

The aid of the children should not be despised, for when once they become interested in the new innovation, the collection of local caterpillars will certainly be comprehensive.

As each specimen is brought in, particulars as to locality and food-plant should be elicited. The latter proviso is important, for many larvæ are particular in their choice of food, so each batch of specimens should be accompanied by a few leaves gathered from the tree upon which they were taken.

Directions for the rearing of larvæ were given in a previous paper which appeared in the July number of the *Practical Teacher*, but they are important enough to bear repetition.

The food must be as fresh as possible. Sprigs of the food-plant are "planted" upright in the damp sand and renewed daily or as required.

Cleanliness is essential. All uneaten leaves and dead creatures (if any) must be removed speedily, otherwise the establishment will become an eyesore and a general nuisance. Occasionally, when the sand becomes offensive, it should be removed, and a fresh supply provided.

Larvæ which are about to enter the pupal or chrysalis stage naturally evince a great distaste for the company of their fellows. They also have an annoying habit of

seeking the most inconvenient corners for the purpose of undergoing their transformation, consequently when a caterpillar begins to spin, or shows signs of general restlessness, it should be gently removed to the privacy of the pupa cage. By following the above directions there is no reason why the amateur's efforts should not be attended with every success.

Keeping a Record.

To the practical naturalist a notebook is absolutely necessary. However retentive the memory, events which may be interesting at the time of happening are soon forgotten if they are not immediately committed to writing. There is also a remote possibility of some of the entries being unique and consequently valuable.

A ruled diary forms an excellent notebook.

Under each heading should be inserted the events which have taken place in the breeding-cage during the day, recent additions, emergences, &c., and all observations and queries as to habits might be noted for future investigation. At the end of the year the diary will be highly interesting, especially if roughly indexed, not only as a record of the past, but also as an almanac or guide for the ensuing season.

By consulting its pages previous to setting off on a country ramble, the collector will know exactly what insects to look for and where to find them. I had hoped to give particulars from my own insect "directory" for the benefit of intending collectors, but perhaps it will be convenient for them to appear at a later date.

In conclusion. The rearing-cage depicted, which forms the basis of these notes, has been in active use for nearly a year, and is still good enough for another season's work. During the past season it was supported entirely by voluntary contributions, both local and provincial, and proved to be an exceedingly popular exhibit with the children of the Stepney district. Most of the pupæ and cocoons shown are now empty, but we are confidently expecting some fine examples of the Large and Small Whites to emerge shortly from the spiky chrysalides braced against the framework at the top.

PRACTICAL HELP IN THE ARITHMETIC LESSON.

BY GEORGE COLLAR, B.A., B.SC.,

Joint Author of "A New Arithmetic."

MANY teachers lament that it frequently happens that it takes them much longer to set the sums than their pupils take to work them. This difficulty is felt particularly in the lower standards, where the nature of the case makes the employment of books of examples less practicable than it is in the upper classes. It is felt most keenly in setting problems, and in cases in which the teacher has to work his class in two or more sections. The essential feature of our "Scheme B" is that it should deal with small numbers, cover a considerable variety of work, and be presented in a concrete manner.

We shall now describe a system which is very largely employed in Switzerland, and is drawn up by Herr Ph. Reinhard, a teacher in Berne. The apparatus consists of a wall chart about one metre square, in which the following table is printed with white figures on a black ground :—

PH. REINHARD

TABLEAU DE CALCUL

I.

Problèmes avec nombres d'un seul chiffre.

2	7	9	8	3	9	5	6	2
7	4	6	5	8	6	10	3	7
4	9	3	10	5	3	2	8	4
9	6	8	2	10	8	7	5	9
6	3	5	7	2	5	4	10	6
3	8	10	4	7	10	9	2	3
8	5	2	9	4	2	6	7	8
5	10	7	6	9	7	3	4	5
10	2	4	3	6	4	8	9	10

Berne—A. Francke, Editeur.

The same table is printed on cards, six inches by four and a half, for the use of the scholars. These might be employed either with or without the wall chart, though the latter is useful for class demonstrations and for explaining to the children what they have to do with their cards. A handbook for the teacher is also published, which explains the use of the tables, and gives answers to the problems that can be based on them.

It will be noticed that each column contains the numbers up to 10 in cyclic order, but we may remark on the absence of 1 and of 0. The table does not include 0, as that would have introduced difficulties in its use in some sections of work, and although children require instruction in the operations involving 0, they require very little practice in them. We notice that the last column is the same as the first, and the sixth column the same as the third, while no column begins with 4 or 10. It would perhaps be better to avoid this, because our experience of children shows that they will recognise the identity and avail themselves of it; but if the columns all begin with different digits, children will not recognise the cyclic order, but the teacher can make great use of it. Thus, suppose that each column began with the fifth number in the column preceding it, the pupil would be able to gain practice by repeating the operations with the same numbers as at present, and the teacher, knowing the cyclic order, would easily check the results.

The preface to the handbook claims that by means of this table about a hundred different problems can be given with a very few words, which results in the twofold advantage of a saving of the teacher's voice and throat, and of a great economy of time, for the time that would be employed in stating the problem can be devoted to the solution of it. Thus a greater number of sums can be worked in the same space of time, all of which helps to develop the pupil's skill.

Although the table was at first intended merely to give practice in the multiplication table, it can be used in teaching vulgar and decimal fractions, percentages, and square root. The exercises in which tens and hundreds digits occur make it advisable to reprint the table and substitute 1 for 10.

The following are among the exercises given in the handbook :—

Preparatory Exercises.—Read the numbers in horizontal lines; add 1 to each number; subtract 1 from each number; add 2 to each number; take 2 from each number; decompose the numbers.

Exercise 1.—Add the numbers in each vertical column two at a time: 2 + 7 = ? 7 + 4 = ? up to 10 + 2 = ? Each exercise can be transformed into a concrete example: 2 apples + 7 apples; 7 nuts + 4 nuts, etc.

Exercise 2.—Add the numbers three at a time: 2 + 7 + 9 = ? 7 + 4 + 6 = ? up to 10 + 2 + 4 = ? Then take 7 + 9 + 8, etc.

Exercise 3.—Before each number in the table place a ten, and subtract the following number: 12 – 7; 17 – 4.

Exercise 4.—Before each number in the table place a ten, and add the following number.

Exercise 5.—Add the first two numbers, and subtract the third: 2 + 7 – 9, 7 + 4 – 6.

Exercise 6.—Take the first two figures as tens and units, and add the third: 27 + 9, 74 + 6.

Exercise 7.—Take the first two figures as tens and units, and subtract the following: 27 – 9, 74 – 6, up to 12 – 4, then take 79 – 8, etc.

Exercise 8.—A test on the multiplication tables—for example, twice each number on the card; three times each number, etc. This is a capital oral exercise.

Exercise 9.—The single columns are added up as in "long tots."

Exercise 10.—Take the first two numbers as tens and units, and add the third taken as tens: 27 + 90 = ? 74 + 60 = ?

Exercise 11.—Take the first two numbers as tens and units, and add the third and fourth taken as tens and units: 27 + 98, 74 + 65, up to 12 + 43, then take 79 + 83, etc.

Exercise 12.—279 + 839; 746 + 586, etc.

Exercise 13.—279 + 789; 746 + 465, etc.

Exercises 14–16.—Addition of numbers similarly formed of four neighbouring figures.

Exercise 17.—Place a hundred before the number formed by the figures of the first two vertical lines, and subtract the numbers formed by the second and third: 127 – 79, 174 – 46, etc.

Exercises 18–20.—Similarly 1279 – 798, 1746 – 465, etc.; 2798 – 279; 7465 – 746; 12798 – 7983; 17465 – 4658.

Exercises 21.—27 × 9, 74 × 6, up to 12 × 4, then 79 × 8, etc. Concrete examples :—Find the cost of 27 metres of stuff at 9 francs a metre. Of course, an English teacher could substitute yards and shillings.

Exercises 22–37.—Multiplication of numbers formed from the digits of the table taken in order two, three, and four at a time, including cases in which numbers are multiplied by themselves. The results of these can be retained for practice in extracting the square root.

Exercise 38.—Divide 1000 by the numbers formed by the first two vertical columns, 2000 by those formed by the second and third, 3000 by those formed by the third and fourth, etc. Here we may say that in such exercises the Swiss follow the sensible plan of omitting the third and subsequent decimal places, and increasing the second, if necessary, for the approximate correctness.

Exercises 39–41.—Long division: 1000000 ÷ 279; 2798 ÷ 79; 1000000 ÷ 2798, etc.

Exercise 42.—Reduction of vulgar fractions to two-place decimals: $\frac{2}{7} = \cdot 28$, $\frac{7}{4} = 1 \cdot 75$, etc.

Exercise 43.—Addition of vulgar fractions: (*a*) preparatory examples with the same denominator, $\frac{2}{9} + \frac{7}{9}$; $\frac{7}{6} + \frac{4}{6}$. Then (*b*) general types: $\frac{1}{2} + \frac{1}{7}$; $\frac{1}{7} + \frac{1}{4}$.

Exercise 44.—$\frac{2}{7} + \frac{2}{8}$; $\frac{7}{4} + \frac{6}{5}$, etc.

Exercise 45.—Subtraction of vulgar fractions: $2\frac{7}{9} - \frac{2}{8}$; $7\frac{4}{6} - \frac{6}{5}$, etc.

Exercise 46.—Multiplication of vulgar fractions: $\frac{2}{7} \times \frac{7}{9}$. These all afford instances of cancelling; then take $\frac{2}{7} \times \frac{9}{5}$, etc.

Exercise 47.—Division of vulgar fractions: $\frac{2}{7} \div \frac{9}{5}$, etc.

Exercise 48.—A building site 27 metres square is sold at 9·80 francs per square metre. What is the cost? Ditto, site 74 metres, at 6·52 francs per square metre?

Exercise 49.—Calculation of percentages: 1 per cent. on 200, 700 francs, etc., on 270, 740 francs, etc.; 2 per cent. on 790 francs; 7 per cent. on 460 francs?

As the need for variety of problem increases, so the need for exercises in pure calculation diminishes, and books of problems must take the place of such a table as this. But we have, no doubt, said enough to show of what a vast amount of service such a table may be. It is found very useful in Swiss schools, and it should be still more useful in English schools, because our weights and measures table and our money tables are not decimal ones, and require much calculation, which is obviated by the use of the metric system. Thus we can set such exercises from it as :—27d. = ?s.; 74d. = ? 27s. = ?£; 74s. = ? 279s. = ? 27 feet = ? 27 oz. = ? 279 lbs. = ? etc.

There are two editions of the handbook, one in French and one in German, but most of our readers should be able to read one or the other. We should like to see an English translation or adaptation of it.

NATURE STUDY.

SOME PROTESTS FROM THE PRACTICAL SIDE.

THE present writer is in active sympathy with all the efforts (one of which is the advocacy of nature study) to reform school curricula by following the lead of child nature and substituting for some of the old formal studies subjects which are naturally interesting to children, yet at the same time truly educative.

Enthusiasts, however little acquainted with actual school conditions, often make very sweeping statements and criticisms. They advocate plans which cannot be carried out in their entirety in the existing conditions. Now, there would be no harm in their setting before us a high, even if at present unattainable, ideal, did they not ignore, or worse still, despise and deprecate, the humbler efforts which many of us are making.

One, full of laboratory methods and perhaps imbued with the idea that "science is measurement," says that every student or child must grow seedlings, measure their rate of growth, and plot out the results on squared paper. Each one must perform experiments illustrating the chief facts in the physiology of plants. Experiments performed by the teacher, even if he is helped at every point by the children, who are made to observe closely and think exactly about what is being done, are

of little or no avail, nor is any other kind of teaching particularly valuable.

Another, equally full of enthusiasm for the side of the subject which appeals to him, dismisses almost with contempt indoor work of any kind. Country walks "with a definite object in view" are the only means of teaching worth the time spent; plants and animals are living things, must be studied alive and in their natural surroundings.

Such critics forget two great limitations which to some of us are obvious enough. In the first place, nature study, however valuable, is not the only branch of elementary education, nor indeed a main part. The various studies which cluster round the mother tongue, the elements of arithmetic, drawing, singing, the useful and interesting information other than nature knowledge —which of these can we omit?

Secondly, the average size of classes in the elementary schools is perhaps about sixty children, or at any rate an adult teacher is responsible for about that number, and often for more. This is a deplorable state of things, but there it is, and the remedy can only come slowly.

A few moments' thought, therefore, will show that neither of the methods mentioned above can be used to any very great extent, and can certainly not be relied upon entirely, or nature study disappears. This is especially so in the case of town schools, which the writer has largely in mind.

In these schools plentiful objects of interest are not to be found in lane or field close by, but a journey of some length must be taken, the whole half-day being required. Add to this that it is in most cases impossible to put the children to any expense, and the limitations become very apparent. There remains only the public park in some cases, and the critics we are considering would be the first to say that that is a poor substitute for the country walk.

Yet one feels that nature study—some acquaintance with plants and animals and their ways—is part of the birthright of every child, and this raises the question, *Can* nothing in fact be done? The practical teacher answers at once that much can be done.

Take the autumn season, for instance. If quantities of wild fruits and seeds are brought into the school, if children are made to examine such things as the acorn, beech-nut, hazel-nut, chestnut, and horse-chestnut, to note and tabulate the points of likeness and difference, to draw them, talk about them, and write about them in simple yet accurate language, besides picking up many things in the conversation of the lesson, is such work to be scouted as useless?

Or look again at the ways in which various plants meet the winter. We need not go and stand out in the cold to study winter buds—the twigs may be gathered and taken into the classroom. Bulbs, etc., can be bought, examined, grown in flower-pots or boxes, and so on.

With regard to the study of animals, of course here, too, the advantage on the side of the country is enormous. Besides the animals of the farm and wild birds, every ditch, every hedgerow, teems with insects and other of the smaller forms.

But the natural interest in animals and their ways must have been noticed by every lover of children —one pities the little one whose early years are provided with few or no opportunities for its satisfaction. Can nothing be done for the town child?

Here also the writer must venture to dissent emphatically from two opinions put forward in a recent lecture by a very eminent man. We were told that our selection should be "guided always" by the objects which can be seen in a country walk. Surely this is pushing a principle too far. Why not teach about "lions and tigers, porcupines and spiders," to quote the showman's catalogue, if it happens that any of these can be practically illustrated, and especially if the creatures are mentioned in stories which the children read or are told? It is one thing to criticise an object-lesson scheme in which a lesson on soap is followed by others on the elephant and a steamship, and quite another to bar altogether lessons on objects which the children do not immediately see. Because that supremely interesting creature, the king of beasts, cannot be brought into the schoolroom, must we never tell our pupils that its structure in tooth, tongue, and claws, its mode of attack—the stealthy approach, taking advantage of all cover, and the final sudden spring—are exactly the same as they may notice in pussy at home? And so in other cases.

"Wild-beast shows" sometimes visit towns, and every one knows how attractive they are to the juvenile population. Can we not make the visits more profitable in some small way?

Then, too, a natural history museum is often available, and though stuffed specimens are poor things in comparison with living ones, who shall say that nothing can be done by means of them?

We were further told that we should not keep living animals in or about the school, on the score of cruelty, even the aquarium and vivarium being specifically mentioned and condemned. Now one can understand the objection to the keeping of a skylark, which ought to be aloft flooding the air with song, beating its heart out against wood and wire, or a squirrel, that bright little denizen of the woods, carrying on a wretched existence between a stuffy little sleeping-box and a treadmill. But an aquarium, for instance, properly fitted up, with attention to bed, water-weeds, and surface exposure, is a miniature pond, and the creatures within it are almost in their natural conditions, while at the same time a source of endless delight.

Or to take another instance, how can one study a caterpillar except by bringing it home, feeding it, and watching its growth and transformations? There is no cruelty; a caterpillar's instincts are few and simple—give it plenty to eat, with a quiet corner for pupation, when the time arrives, and its needs are fully satisfied.

Just a word to other enthusiasts. Little purpose is served by claiming for nature study that it conduces to the physical development of children because of its outdoor excursions. It may do so; so does a game of cricket. Nor by saying that it makes school pleasant. It may and does do so; but so may other branches, especially history and English literature properly taught. Let us not lose the proper perspective.

The writer speaks as a keen naturalist, a lover of children, and withal as a practical teacher and teacher of teachers of some experience, second to none in enthusiasm for the subject, but would plead with inspectors and other critics for a broad-minded tolerance, a sympathetic appreciation of all genuine efforts, however humble, and a realisation of the conditions and limitations under which spade-working teachers have to carry on their labours.

E. A. S.

THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

Letters should be addressed—INSPECTOR, c/o THE EDITOR, 35 Paternoster Row. *Questions requiring prompt answers are dealt with by post if two stamps are enclosed.*

"*Dorchester*" passed the K. S. Examination in 1902. He asks whether he may sit again in 1905, and proceed to the Certificate in 1906.

Answer.—He may sit again in 1905, and may, if he wishes, take the 1906 Certificate Examination. He has fulfilled the requirement of being an uncertificated teacher for at least one year, and presumably he will be twenty years old before October 1, 1906.

G. B. asks me about the requirements for inspectorships under the Board of Education, and also under local authorities. He also wants to know whether a secondary schoolmaster with the London B.A. could obtain a mastership in an elementary school, and if so, at what salary.

Answer.—Candidates for Government Inspectorships must be between the ages of 23 and 35, and must furnish evidence of having received a liberal education, and of knowledge of the theory and practice of teaching. Weight will be given, among other qualifications, to the possession of a University Degree in Honours or other like distinction. For full information write for a memorandum to the Secretary, Board of Education. There are no specific qualifications generally laid down for local authority inspectorships. Usually a University Degree is a *sine quâ non*. There is no difference between the qualifications necessary for elementary school and secondary school inspectorships under Government. A graduate is, by virtue of his degree, eligible to be recognised as an uncertificated teacher, and as such could procure an assistantship at about £70 per annum. As soon as the graduate possesses a University Teaching Diploma he becomes qualified as a certificated teacher, and can then apply for a headmastership of any primary school.

L. B. wishes to obtain employment as a teacher. She holds various certificates, and is a qualified chemist and L.L.A.

Answer.—I have little doubt that you would at once obtain employment, but, unfortunately, only in the lowest rank of assistants, viz. supplementary. Your salary would not be more than £35 to £40 per annum at first. Your L.L.A. Certificate is short of one or two subjects stated in the Code (see Schedule I.) to be absolutely necessary in order to rank as an uncertificated teacher. Could you not enter for these extras, and you would then obtain a salary of £50? Afterwards you could enter for the Government Certificate Examination. If you passed you would be eligible for a post as headmistress, and receive at least £75 per annum. Buy an N.U.T. copy of the Code, and study Schedule I., pages 34–40, relating to teachers.

F. G. is a clerk who is studying for the K. S. Examination, with a view to entering the teaching profession. He wants to know how he can obtain marks for practical teaching.

Answer.—Marks for practical teaching can only be obtained by candidates who are employed as teachers in any recognised capacity, or who have been so employed, within two years preceding their examination, in a school under inspection by the Board of Education. F. G. can therefore not receive any marks.

A. B. D. asks: (1) Are there any Correspondence Classes preparing for Froebel Certificate?

(2) To help with practical knowledge, do you advise me to have a class of private pupils or to join some school?

(3) What salary could I expect as a second class K. S.?

(4) Could I obtain a post in a workhouse school with second class K. S.?

(5) Where can I make inquiries for such a post?

Answers.—(1) I know of no classes which quite meet the case. Write to Professor Cusack, Day Training College, Moorfields, London, or Normal Correspondence College, 110 Avondale Square, London, S.E., or indeed to any one of the many correspondence class people.

(2) I advise you to become an assistant in an elementary school.

(3) £45 to £55.

(4) I believe so.

(5) Watch the scholastic papers and the London dailies.

"*Would-be Inspector*" desires to become a junior inspector of schools. He asks what are the necessary qualifications, and also my opinion as to the best means of obtaining the post.

Answer.—See answer to *G. B.* above, and for further information write to the Secretary, Scotch Education Department, Dover House, Whitehall, S.W. A good honours residential degree and a teaching diploma granted by a University are two of the most advisable qualifications.

"*De Serf*" asks for the publishers and prices of (1) Quick's "Educational Reformers"; (2) James' "Talks to Teachers."

Answer.—Both published by Longmans, Green & Co., 39 Paternoster Row, London, E.C. (1) 3s. 6d., (2) 4s. 6d.

P. C. C. asks for information as to where copies of the official reports upon education in our colonies can be obtained, and as to the cost thereof.

Answer.—Since 1896 at least a dozen volumes of the kind you name have been issued by the Board of Education. The most popular papers from these reports have been published separately as reprints at about 8d. each. I think it would be well for you to write to Eyre & Spottiswoode, East Harding Street, Fleet Street, E.C., for a list of such publications. They could probably also quote you prices, including postage to Gibraltar.

A. B. D. asks whether the Frœbel Certificate is equivalent to the Government Certificate, and if not, what status it would give a teacher in an elementary school. She also asks what salary it would command, and if it would be possible to study for "Certificate" and teach at the same time.

Answer.—Frœbel Higher Certificate qualifies as an *uncertificated* assistant in an infant school at a probable salary of £50. You could hold such a position and continue your studies with a view to becoming fully certificated. Generally speaking, the "D" would not obtain for you a higher salary.

NOTES OF LESSONS ON THE SPIDER

Class.—These lessons are suited to the upper standards of either urban or rural schools, particularly those in which Nature study is systematically taught.

Time.—Two lessons of about thirty minutes each.

Object.—To interest the children in the study of the lower animals. The love of Nature begins in a

child with an affection for the domestic animals, and interest in their structure and habits is easily awakened. This interest will then extend to the beauteous creatures of the woods and fields, the squirrel in the branches, the rabbit in the underwood, and the lark soaring in the air. These things are of themselves attractive to the child, and little encouragement is needed to foster the love of Nature in these directions, but there is a strong prejudice against "crawly things" which leads in the case of girls to silly exhibitions of groundless alarm, and in the case of boys to wanton cruelty, and it is only by setting before the children the beautiful and delicate structure of these creatures and their marvellous constructive skill, and thus gradually interesting them in their ways and habits, that this prejudice can be overcome.

Step I. Preparation.—The spider is a capital subject for testing the progress of the children in the cultivation of the habits of observation. During March the spiders are busy with their webs, and every child can easily find one and watch it for a few days, taking notes of its structure and habits. After sufficient time has been allowed for observation the result should be tested by a composition exercise on the spider. Leaving the literary side of the exercise to be dealt with in the English lesson, the facts should be examined, careful note being made of all errors and of any points calling for special commendation. Some of the errors will be due to carelessness and insufficient observation on the part of the child, which should be dealt with by the teacher according to the circumstances of the case; some, on the other hand, may be due to faulty reasoning, and care must be taken in dealing with these not to damp the ardour of the young naturalist.

Step II. Presentation.—All the best points of the foregoing exercises should be gathered up, and the necessary information added to fill the gaps, and thus present to the children a good outline of the structure and habits of the spider.

1. *The Structure of the Spider.*—The following parts of the spider can be seen under a good hand-glass:—

The Eyes.—These are situated in the upper part of the head, and are generally eight in number. Their position varies in different kinds of spiders, and serves as an important characteristic for purposes of identification.

The Forceps.—These somewhat resemble the claws of a lobster. They spring from the head just below the eyes and terminate in a sharp claw-like fang. This is perforated by a fine hole in the same way that the fang of a serpent is, and completes the resemblance by being connected with a gland which secretes a poisonous fluid. The act of striking the victim with the forceps forces out a drop of poison, thus enabling the spider to overcome victims much larger than itself in a very short time.

The under jaws are furnished with a pair of appendages somewhat resembling the antennæ of an insect, and yet quite distinct from those organs both in structure and functions. The sex of the spider may be distinguished by these appendages, as in the male the last joint swells out into a kind of hairy knob, but in the female it finishes with a claw.

The Legs.—The spider has eight legs, the last joint or foot of each being furnished with tiny curved claws. The under side is covered with stiff hairs which serve as a "thumb" in meeting the curved claws, thus enabling the spider to grasp the threads in weaving its web.

The Spinnerets.—These are the organs that enable the spider to spin the threads of which its web is composed; they vary in number, but are always situated at the extremity of the abdomen. The spinnerets secrete a peculiar viscous fluid which is drawn out in fine threads through minute holes in their tips; these threads run together like the strands of a rope forming a strong filament which hardens on exposure to the atmosphere.

2. *Habits of the Spider.*—Spiders differ very much in their habits and mode of life, some like the open air, others prefer an indoor life—some hide themselves in the ground, and some even spend their time in the water.

The common house spider prefers a corner in which to build its web. It commences by pressing its spinnerets against one of the walls, thus fixing the end of its thread, he then walks round to the other side of the angle, pulls the thread tight, and fixes the other end. This thread forms the boundary of the web, and as it has to bear most of the weight the spider carefully strengthens it with two or three more threads. In the triangle thus formed the spider runs threads in several directions, and fills up the interstices with fine threads, forming the gauze-like web that serves to entangle the unwary fly.

The garden spider builds a more geometrical web than the house spider, and whenever possible places it in a vertical position. Selecting several accessible points he runs a thread from one to the other, thus enclosing a space, across which he fastens a number of threads all meeting at the centre like the spokes of a wheel. Starting at the centre the spider goes round and round, carrying the thread across from one spoke to another, gradually widening the space between the threads until the boundary is reached. How does the spider manage to get all these threads exactly parallel to each other? If you watch you will see that he passes the thread over the claw at the end of his leg, then by stretching out his leg he converts himself into an animated pair of compasses, keeping the new thread at the proper distance from the last one. These cross threads differ from the radiating threads, for the former are studded with minute drops of sticky liquid which cause the victim to adhere to the web. In the centre the spider leaves a space for himself that is free of these sticky drops, and here he lies in wait, his favourite attitude being head downward.

Some spiders do not spin a web. Of these the most interesting is the water spider, which may be found in the pools and ditches in many parts of England. It is about half an inch in length, and is covered with a quantity of very fine hair. The water spider breathes in exactly the same way as the land spider, the air it breathes being carried down into the water entangled in its hairy coat. It constructs for itself a hive-shaped house, which it fastens by threads to the stalks and leaves of aquatic plants. The spider makes repeated journeys to the surface, and each time carries down a bubble of air until the house is full of air like a little diving-bell. Here it deposits its cocoons and rears its young ones.

Another class of spiders who prepare no snare capture their prey by springing upon it like a cat on a mouse. The British leaping spiders are mostly very small and perfectly harmless, but the Tarantula, found in the south of Europe, is much dreaded for the poisonous

nature of its bite. Among other foreign spiders are the crab spiders; these grow to a considerable size, sometimes exceeding six inches in total length, and are said to seize and devour humming-birds. They excavate a hole in the ground wherein they live, and to prevent detection the mouth is covered with an accurately-fitted lid which moves upon a hinge. There is one family of trap-door spiders to be found in England, but it is not often met with.

Step III. Association.—The popular idea is that the spider is an insect, but if we now compare it with a fly or an ant we shall see that it differs from these in many important points.

1. The body of an insect is divided into two parts, and the head is distinct from the body, thus making altogether three divisions—head, thorax, and abdomen, but in the spider the head and thorax are joined so as to form one piece.
2. No insect has more than six legs, but the spider has eight.
3. Insects are provided with two antennæ (or feelers as they are often called), but, as we have seen, in the spider their place is taken by totally different organs.
4. Insects pass through several changes before they attain their perfect form, but spiders undergo no such change.
5. Insects breathe by means of a network of tubes which are placed all over their bodies, but the spider possesses a special respiratory apparatus situated in the abdomen.

Although not a complete list, these are points of difference of sufficient importance to show that the spider must not be classified as an insect. In point of fact, it more resembles a lobster than it does an insect. In both the lobster and the spider the head and the thorax are welded into one piece, each has a hard covering which it sheds as it gets too small for its growing body, and both are able to reproduce lost limbs.

Step IV. Formulation.—The chief parts of the spider are: the eyes (eight in number); the forceps, armed with a poison fang; the under jaws, which distinguish the male from the female; the legs (eight in number), each ending in a foot armed with tiny curved claws; the spinnerets, which make the silky threads of which the spider constructs its web.

The house spider spins a horizontal web in the corner of the room.

The garden spider spins a circular web among the bushes. The cross threads are studded with a sticky fluid.

The water spider passes its time in the water, breathing the air that it carries down entangled in the hairs that cover its body.

Some spiders catch their prey by springing upon it.

The largest spider is the crab spider; it lives in a hole in the ground which it covers with a trap-door. The Tarantula is dreaded for its poisonous bite.

Step V. Application.—The knowledge gained in these lessons should lead the children to enlarge their sphere of observation. Having seen some of the beauties and points of interest of these lower creatures they should include them among the objects of Nature that claim their attention.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

A NEW OVERLAND ROUTE TO AUSTRALIA.

London to Melbourne by Rail.

THE very statement perchance causes a smile of incredulity, yet in these days of great railway projects the scheme will provide subject-matter for interesting survey and speculation. London to Melbourne under present conditions entails a sea voyage of 11,690 miles, the passage even by the fastest vessels occupying thirty-six days. It is now possible to travel by rail across two entire continents by the European railway systems and the Trans-Siberian line, a total distance from the English Channel to Vladivostock of about 8800 miles. A similar distance in another direction will carry us well upon our way to the land of the Southern Cross.

The crossing of Europe is a comparatively easy matter *via* Vienna and Moscow to Petrovsk on the western shore of the Caspian Sea. Here occurs the first break, for there is yet no line that will enable us to reach Krasnovodsk on the opposite coast. From this point it is possible to take train to Kushk, on the border of Afghanistan.

Afghanistan possesses no railway except a short local line at Cabul. But the realisation of the Amir's desire to obtain an outlet to the sea to foster the trade of his country would speedily bring a railway in its wake from a port in the south-western corner of Baluchistan to the capital; and the continuation of the line to Kushk would naturally follow. At any rate a distance of only 400 miles separates Kushk from Chaman, the advanced outpost of the Indian railways. India is traversed easily enough by the existing lines to Calcutta, where we again come to a halt. A few hours' journey down the Ganges brings us to Toobkebaugra, with a railway as far as Chittagong. The nearest railway is at Mandalay, a distance of 300 miles, at

which point we again find an iron road to convey us to Rangoon, 350 miles further south. There is now a long stretch of 1200 miles down the Malay Peninsula. At present there is no railway, except one in course of construction through the Federated Malay States from Singapore to Penang. The final junction of Singapore with the Burmese and Indian railways is but a matter of time, for the trade of these regions will make railway communication an absolute necessity.

The most broken part of the whole journey commences at Singapore. A water passage of 35 miles lands us on the coast of Sumatra, across the eastern end of which a short line will be necessary to reach Petada, the port at which to embark for Java, 40 miles away. Java already possesses a railway from Batavia to Surabaya, practically the whole length of the island. At this point we are 1250 miles from Port Darwin, a sea passage of five days.

There is yet no railway across Australia. The lines are chiefly from Sydney, Melbourne, Adelaide, and Brisbane, and only the first three are connected with each other. But a trans-continental railway is now more within the bounds of possibility. From Port Darwin a line extends southwards as far as Pine Creek, a distance of 100 miles; and from Adelaide in the south a line extends northwards to Charlotte Waters, a distance of 700 miles. The intervening space across the centre of the continent is about 1000 miles, and it is the arid and unproductive nature of this region which brings a pause in trans-continental railway enterprise. There are also other schemes afoot that are of greater utility. A line has already been surveyed to connect Broken Hill, the terminus of the Adelaide line, with Bourke, the terminus of the Sydney line, the construction of which will allow of communication between Adelaide and Sydney without traversing Victoria as at present. Another scheme is to connect Perth with Adelaide by a line skirting the southern coast. If this were constructed, the linking up of Perth and Port Darwin would be well within the range of possibility.

The total distance over the Overland Route from London to Melbourne is over 12,000 miles, of which quite 10,500 miles are on land; and it is an astonishing testimony to the universality of railways that so great a journey, at least as far as Singapore, can already be accomplished with so few breaks in continuity. The following is a brief summary of the various stages of the journey, with approximate distances and times occupied in transit, which the sketch map on p. 457 will enable our readers to follow:—

Stage.	Miles.	Days.
London to Moscow	2131	3½
Moscow to Merv	1700	3½
Merv to Peshawr	600	1
Peshawr to Calcutta	1400	4
Calcutta to Chittagong	300	1
Chittagong to Mandalay	300	1
Mandalay to Rangoon	350	1
Rangoon to Singapore	1200	2
Singapore to Java	1100	2
Java to Port Darwin	1300	4
Port Darwin to Melbourne	2000	5
Overland Route	12,281	28
Sea Route	11,690	36

BRITAIN'S COALFIELDS.

Duration of the National Supply of Coal.

The enormous quantities of coal that for long years have been increasingly mined in Great Britain have again necessitated inquiry into the probable duration of the national supply. A Royal Commission was appointed in December 1901, and its report was issued five weeks ago.

Before considering the conclusions at which the Commissioners have arrived it will be of interest to go back to the last similar inquiry in 1871. The chief questions to which answers were then sought were as follows:—

1. What is the depth to which coal may be worked?
2. What is the attainable quantity of coal in our known coalfields?
3. Is coal wasted in working?
4. Is the ascertained rate of consumption likely to increase?

The Commission calculated that there were 90,207 million tons of coal available at a depth of less than 4000 feet, the maximum depth at which work appears to be possible in this country. Coal was reported to be wasted in working to the extent of 30 per cent, chiefly on account of it being mined solely for profit without the slightest thought for posterity. The annual production at this time was 115 million tons, compared with 60 million tons twenty years earlier. How long the estimated supply would last found widely differing estimates, varying from a thousand years to as low as a hundred and ten.

Turning to the Report just issued it is gratifying to find that the available coal supply is now calculated to be 100,914 million tons, or 10,000 million tons more than in 1871, notwithstanding the fact that between the two Commissions no less than 5462 million tons of coal have been brought to the surface.

Dealing with the probable duration of our coal resources it is pointed out that the question turns chiefly upon the maintenance or variation of the annual output. The average increase has been about 2½ per cent., but it is considered that is not now likely to be maintained. Owing to the exhaustion of the shallower collieries the increase of output will become slower, followed eventually by a gradual decline. On the other hand, this decrease may be postponed by the reopening of coalfields where only the shallow seams have been exhausted. A vigorous attempt is being made to resuscitate the output of the South Staffordshire coalfield, where the mines have been flooded for many years. Pumping operations on an immense scale still enable work to continue at a profit, but if it is possible to overcome the water, the yield would doubtless exceed that which obtained in the palmiest period of the Midland industry.

Coal-cutting machines, and improvements in cleaning, sizing, and sorting the coal for market, are largely reducing the waste that was formerly so common. The very smallest coal can be utilised in the making of briquettes, whereas formerly it was left in the mines because it did not pay to bring it to the surface.

Two other interesting points dealt with are the effect of the export of coal on British consumers and the Royal Navy, and our competitive power with the coal-mining industries of other countries.

There is no doubt that the maintenance of a large coal export trade is of the highest importance to the country, and especially to the coal-producing districts. But for coal a vast number of ships that come to our shores laden with foodstuffs or raw materials for our manufactures would return empty, and unless a return cargo were available they probably would not come at all except on the payment of greatly increased freightage rates. There is a tendency to lessen the consumption of coal for naval purposes by the use of oil fuel for many auxiliary purposes.

The Commission says that Germany and the United States are our chief competitors in the world's coal market. While the British production of coal since 1871 has about doubled, that of Germany has increased fourfold, and that of the United States tenfold. Other countries have also increased their output considerably.

The output in the five chief coal-producing countries of the world during the period 1901–3 was as follows (in million tons):—

Year.	United Kingdom.	United States.	Germany.	France.	Belgium.
1901	219	261	108	31	22
1902	227	269	107	29	22
1903	230	320	116	34	23

In exports, however, the supremacy of the United Kingdom is most marked, as shown by the figures for 1903:—

COAL EXPORTS.

United Kingdom . .	63,805,000 tons
Germany	20,808,000 „
United States . . .	8,358,000 „

NOTES ON AN EXPERIMENTAL COURSE OF LESSONS ON AIR AND WATER.

BY E. J. RUSSELL, D.SC. (LOND.),

Lecturer in Chemistry at the South-Eastern Agricultural College, Wye.

(*Continued from p. 400.*)

Air is Necessary for Plant Life.

Experiment 44.—Put some stiff clay soil into a tumbler or glazed jar, sow in it a few grains of barley or oats, and cover with about an inch of the soil, working it so thoroughly with water that it forms a layer impervious to air. Keep the jar loosely covered to check evaporation of water, otherwise the soil cracks and the experiment is spoiled. As a control experiment, sow the same number of seeds in an equal quantity of soil which has not been made impervious to air.

This partly explains the necessity for having a fine tilth on a seed bed.

Experiment 45.—Moisten a few seeds, put into a specimen tube or short test tube and cork tightly. Coat the cork with wax to ensure it being air-tight. Put some seeds into another tube, moisten but only cover loosely. Air is excluded in the first case but not in the second. Keep the tubes side by side, germination only takes place when air can get in.

Plants, however, can tolerate the absence of air much better than animals can. If an air-pump is obtainable the following experiment is instructive:—

Experiment 46.—Grow a plant, *e.g.* a nasturtium, in a bottle, and when it is well advanced connect with the air-pump and exhaust. The plant may continue to live for some weeks, its mode of respiration takes a fresh course, and the necessary oxygen is obtained from the plant substances.

The necessity of air for animal life cannot be made the subject of suitable experiments for children.

Constituents of the Air.

Only one-fifth (more accurately 20·97 per cent.) of the air is useful for burning. This part is called active air or oxygen.

It is sometimes stated that ozone (an active form of oxygen) is found in the air, and especially at seaside places. There is no convincing evidence that this is the case. The tests usually applied are also answered by other substances known to occur in the air.

Experiment 47.—Float a little cork boat containing a piece of phosphorus in a basin of water, ignite the phosphorus, and stand over it a glass jar. The water rises in the jar because some of the air is used up; much of it is left, however, and yet the phosphorus was not all burned. See Experiment 43, p. 400.

Experiment 48.—A fairly accurate measurement of the amount of oxygen in the air can be obtained by using a tube $\frac{3}{8}$ inch wide and 2 feet long, sealed at one end and well corked at the other. Drop in a piece of phosphorus and at once insert the cork. Warm the phosphorus very gently, stop as soon as it melts, and tilt the tube to allow the liquid to spread as much as possible. The flame or glow will be so faint that it can only be seen in a dark room, it goes on for some time, and if possible the experiment should be left at this stage and finished in the next lesson. To avoid leakage, stand the corked end of the tube in water. On resuming the experiment open the cork under water, some enters, and the length of the water column compared with that of the whole tube gives the percentage of active air.

UNSKILLED EXPERIMENTERS SHOULD NOT TOUCH PHOSPHORUS.

Rusting is a Slow kind of Burning.

Experiment 49.—Moisten the walls of a glass bottle or jar, shake into it some iron filings, and invert in a dish of water. After a few days rusting is complete. Note the height to which the water rises.

Active air is exceedingly active. The teacher with some chemical training may prepare oxygen by heating potassium chlorate and manganese dioxide, and plunge into jars of the gas various combustible bodies, as a glowing splint, a candle, some burning sulphur, phosphorus, charcoal, watch-spring, &c. But as the oxygen has not been obtained from the air, and as there is no convenient process that the children can follow by which this can be done, the experiment may well be omitted.

There is no proof for the statement often made that if the atmosphere were composed of oxygen alone we should live an excessively vigorous but short life.

The Changes during Burning.

When things burn they are not destroyed but only changed to something else.

Experiment 50.—Fix a funnel above a burning candle, join to it a wide glass tube loosely plugged at the near end with cotton wool, and connected at the other end with a flask containing lime-water. Draw the products of combustion through. Soot deposits on the funnel and on the cotton wool, water in the tube, and a gas formed during burning turns the lime-water milky.

One of the boys made a highly picturesque, but none the less workable, apparatus out of an old feeding-bottle and tubes, and an oil funnel.

The bodies formed weigh more than the original thing did, the increase being due to the active air taken up.

Experiment 51.—Bind some coarse iron wire into a ball and weigh. Heat in a bunsen or blow-pipe flame, allow to cool, and weigh again. The visible loss due to sparks, &c.; is more than counterbalanced by the invisible gain.

This experiment is simpler and much more reliable than the usual one which is:—

Experiment 52.—Over a candle place a chimney filled with soda, lime, and potash to absorb the carbon dioxide and water formed; fix on the balance and counterpoise exactly. Light the candle and leave burning for a time: if the conditions are such that all the products of combustion pass up the chimney and at such a rate that complete absorption takes place, an increase in weight will be observed. The experiment requires careful rehearsing, it is not easy to get the right conditions with ordinary school appliances.

The Inactive Air.

Experiment 53.—Test the gas left behind in Experiments 47 and 49 with a lighted taper.

This gas is mainly nitrogen. It used to be considered an inert gas supporting neither life nor combustion, and as a matter of fact the gas neither supports ordinary life nor allows ordinary combustibles to continue burning. But it does fairly readily combine with certain elements and at least one compound, and moreover it can be assimilated by certain bacteria.

Air as Affected by Breathing.

Experiment 54.—Pour some lime-water into a wash bottle as used in chemical laboratories, breathe air in through the lime-water, and notice that nothing happens. Then breathe air out through the liquid, it turns milky.

Experiment 55.—Respired air further differs from ordinary air in that it will not support combustion. Collect over the pneumatic trough a jar of respired air—the last portion is best—and plunge into it a lighted taper.

Experiment 56.—Construct a box with glass back and front large enough to hold a small cage. Put a live chicken, guinea pig, or young rabbit into the cage and weigh Then place the cage in the box, insert an indiarubber tube into the cage, and draw the air through lime-water. After a few minutes the lime-water turns milky. In about half-an-hour re-weigh; the loss of weight is very distinct.

If a supply of food is put into the cage the animal shows very little concern at having to face a class. And so long as the food is in the cage it is quite immaterial whether it is inside or outside the animal, the weight is not affected.

This instructive experiment is extremely easy to carry out.

Experiment 57.—Moisten some mustard seed, put into a wide-mouthed bottle, stop up, and leave in the dark to germinate. After a few days plunge a lighted taper into the jar, it goes out. Carefully pour some of the air from the bottle into a tumbler containing a little clear lime-water, shake up, the lime water becomes milky.

Experiment 58.—Take two equal lots of seed contained in small dishes or saucers, kill one either by heat or salt, cover with water, place one on each pan of the balance and weigh. Leave for a few days. If it is necessary to add water to the living seeds do it with a teaspoon or measuring-glass, so that you can add the same amount to both lots. Weigh again, notice that the living seeds weigh less than the dead ones.

This experiment is precisely on a par with Experiment 56.

Experiment 59.—Put some green leaves into a bottle, after a few hours blow out the air into lime-water.

Experiment 60.—Germinate some beans and allow to grow till the shoots are two or three inches long. Put in water in a small glass vessel about one inch wide and half-an-inch deep—dishes supplied for bird-cages do very well. Stand this on a small iron or wooden table in a large dish or soup plate containing some caustic soda solution, and invert a glass jar in the dish over the beans. The plants are now in an enclosed space. The gas they breathe out, which has the properties investigated in the two previous experiments, is absorbed by the caustic soda; it will be observed that this rises, showing that some of the air has disappeared. Although the beans will continue to live for a long time, absorption of air only goes on till about one-fifth is taken up. Test the remaining portion with a lighted taper, it does not support combustion, and is in fact nitrogen, the inactive portion of the air.

Compare with Experiments 49 and 46.

From these experiments the following conclusions may be drawn:—

During breathing the plant or animal loses weight, it converts the active air into a gas which is absorbable by caustic soda, turns lime-water milky, and will not support the combustion of a taper.

INDIAN CLUB EXERCISES

FOR SENIOR PUPILS IN ELEMENTARY SCHOOLS.

BY H. RIPPON-SEYMOUR,

Chief Instructor, George Watson's College, Edinburgh; Member International Congress on Physical Education, Paris, 1900; Author of "Physical Training," etc.

Second Series (*continued*).

BEFORE describing the next combined swing it will be necessary for the pupils to learn what are sometimes called "twists."

These are circles, performed principally by a wrist movement, in which the hand forms the centre of the circle described by the club, and in which practically no movement is made by the arms.

The swings behind the head, which have been already described, are really "twists."

Forward Twist.

"Ready."—As previously described. If desired, the pupils may be allowed to turn the shoulders a half-turn to the right or left, as shown in Fig. 1.

"**Commence.**"—Lower the upper end of the club sharply forward and downward, turning the finger-nails up at the same time that the end of the club is

FIG. 1.

down, and slightly relax the grasp of the last three fingers. Complete the circle, when the club should arrive at its commencing position. Repeat as often as necessary.

Backward Twist.

"**Ready.**"—As before.

"**Commence.**"—Lower the upper end of the club

FIG. 2.

quickly backward and downward, and describe a circle in the opposite direction to that of the previous twist.

Note that in both of these twists the clubs pass on the outer side of the arms, and as closely as possible, without actually touching them.

Both of these twists may be made on the *inside* of the arms, in which case they would be called "backward and forward inside twists." They are, however, not greatly used, at all events for class exercises, as they are somewhat too difficult for the majority of children.

When the "forward and backward twists" have been well mastered, the class may attempt the

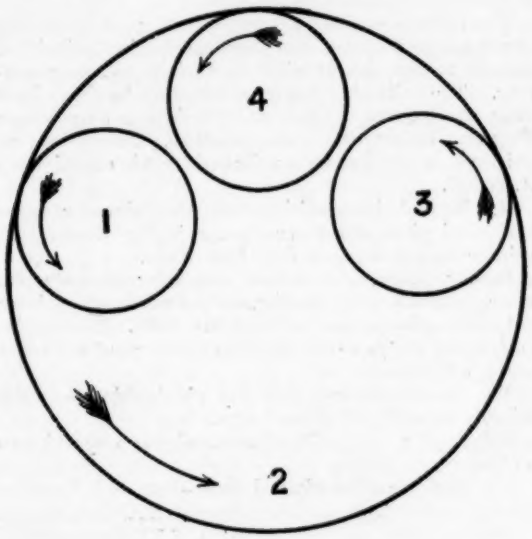
Double Combined Swing and Twists.

"**Ready.**"—As before.

"**Half-right turn.**"—The pupils turn the *shoulders* only; the feet do not move.

"**One.**"—Make a "forward twist" (Fig. 1).

"**Two.**"—Make a "double right swing," as before described, turning the shoulders half-left, and stopping the clubs in a horizontal line, the arms nearly straight (Fig. 2).



"**Three.**"—Make a "backward twist," as shown by dotted line in Fig. 2.

"**Four.**"—Raise the hands, bringing them toward the ears, and make a double rear swing, as before described, to the right, turning the body half-right.

The pupils should now be in the original starting position (see Fig. 1).

Repeat the four movements until some degree of proficiency is attained, and then give the command "Commence," when the four movements should be performed consecutively and without pause. The same exercise should then be practised in the reverse direction, the pupils facing half-left.

This will conclude the second series of swings, and they should be perfected before proceeding to the next series. So far, all the swings have been made in unison, either in the same direction, or even when in different directions, at the same moment. When, however, we come to exercises wherein movements—whether in the same or in opposite directions—are to be made at *different* times, much greater difficulties

present themselves. In certain exercises which will follow, the movements of the hands are practically independent of each other; yet in order that the exercise may be correctly performed and finished, these movements, apparently independent, are really consociated and inter-dependent. Hence they have great "educational" value.

THE BALANCE AND THE LEVER.

BY JOHN B. COPPOCK, B.SC. (LOND.), F.I.C., F.C.S.

Principal, Kendal Science Schools.

ALTHOUGH the balance is probably the most used instrument in the laboratory, it is generally used by students with no knowledge of the details of its construction. They learn that it is an illustration of the "Lever of the first order," and there their knowledge stops. The principles of its construction afford an excellent illustration of the lever, and it can be used to prove the principle of Moments.

The balance can be used in place of specially bought apparatus to illustrate the above mechanical principles, and the results are, as might be anticipated, very accurate. The following experiments may be done by a class, one balance being kept for weighing purposes, or they may be given as a class lecture. The points requisite in a good balance are brought out in experiments *A.* and *B.*

A.—To find the conditions that the balance remains horizontal when at rest, or when swinging to move the pointer equally on each side of the scale.

Remove pans, suspenders, and stirrups from the beam, set the beam swinging, and note that the pointer swings equally on each side of the scale. The explanation can be given here that the two parts of the beam are equal in mass.

Measure the distance from the middle fulcrum to the fulcrum at each end of the beam.

Take each pan with its stirrup and pan suspension to a balance and weigh.

The results can be entered thus—

Length of Arms.	Weight of Pan, etc.	Weight × Length.
Right arm 9·5 cm.	Right pan 20·1 gm.	190·95
Left arm 9·5 cm.	Left pan 20·1 gm.	190·95

The student is now in a position to see that the conditions for the beam to remain horizontal, or the pointer to swing equally over the scale, are that the arms must be equal in length, and the loads at the ends of the arms equal in mass.

This is the condition of equilibrium for a lever of the first type.

Attention is then called to the product of the arm's length and the weights in the third column, where it is again evident that the conditions set forth above can be looked at from the "principle of Moments" and stated in terms of clockwise and anticlockwise phraseology.

B.—To show that a small difference in the masses on the pans gives a good deflection. Place the following weights on the right-hand pan, 1 milligram, 2 milligrams, 2 milligrams, and note the deflection as each weight is added by counting the number of divisions from the middle of the scale swung over by the pointer. The loads on the right-hand pan will be 20·101, 20·103, 20·105 milligrams. Record results thus—

Load.	Arm.	Turning Power.	Divisions passed over.
20·101	9·5	190·9595	2
20·103	9·5	190·9785	6
20·105	9·5	190·9975	10

This brings out the idea of sensitiveness as applied to the balance, and shows also that for a slight increase in turning power there is in a good balance a big deflection.

To experimentally show a proof of the principle of the lever using the balance it is necessary to vary the length of one arm; this can easily be done with an ordinary balance.

Let the left-hand scale pan, which we will call L, remain suspended as usual on the balance. Let the right-hand pan (R) with its suspension and stirrup be removed from the beam. We must now arrange the pan R so as to move it to different distances on the beam. Replace the brass stirrup by a cotton one just large enough to slide along the beam when it has the pan and its suspension attached. Put the brass stirrup upon the pan and allow it to remain there through the experiment. Neglecting the weight of the thread we have equal masses L and R. With L in its position slide R to any position on the beam beyond its proper fulcrum. Place weights into R until the balance is in equilibrium when released from its supports. Measure the distance from the middle fulcrum to the thread.

Slide the thread to different distances on the beam, and each time find the weights necessary to give equilibrium. The weights added in three determinations were 5·704 gm., 10·7 gm., and 15·26 gm., and corresponding lengths of arm were 7·4 cm., 6·2 cm., and 5·4 cm.

Adding 20·1 gm., the weight of R, to each number we get loads of 25·804, 30·8, and 35·36 grams.

The results can be recorded thus—

Weight of Load L.	Left Arm.	Product.	Weight of Load R.	Right Arm.	Product.
20·1 gm.	9·5 cm.	190·95	25·804 gm.	7·4 cm.	190·94
,,	,,	,,	30·8 gm.	6·2 cm.	190·96
,,	,,	,,	35·36 gm.	5·4 cm.	190·94

The figures show clearly how accurate the method can be made, and bring out vividly the fact that for a lever of the first type the turning powers must be equal for equilibrium. There are several ways of measuring the length of the arm connected with the movable load. The distance of the middle fulcrum to the end one having been measured, it was 9·5 in the above experiments; the distance of the thread stirrup to the end fulcrum is then measured and deducted from the full distance; *e.g.* in the first measurement it was found to be 2·1, hence 9·5 − 2·1 = 7·4. If the middle line of the central fulcrum is determined, then of course the distance can be directly measured, but balances do not always lend themselves to this method.

TEACHER AND NOVELIST: A COMPARISON

BY W. MACPHERSON, M.A.,

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THE point of the comparison indicated in the above title may not be obvious at first sight: surely, it might be said, there can be no similarity between the work of the teacher and that of the novelist: the one would seem to stand as widely apart from the other as fact does from fiction. Yet a closer examination will reveal to us that the comparison is not groundless, and will show, too, that it is not an idle comparison, but is based on, and is made possible by, typical modern views regarding the aim and methods of teaching.

In the first place, then, the teacher resembles the novelist in the circumstance that both are engaged in the practice of an art. There are certain general qualities that distinguish a work of art always, whatever particular form it may assume—be it a picture or a group of statuary, a poem or a play, a written novel or a spoken lesson. These general qualities, then, must characterise the work of the teacher no less than the work of the novelist. The teacher's lesson, like the novelist's story, should form a symmetrical and harmonious whole; and it may be criticised generally as an artistic production.

Again, there is a common feature in the *aim* that the teacher and the novelist seek to realise. Considered from a certain standpoint, indeed, the purpose of the novelist would appear to be very different from that of the teacher: the novelist, it might be said, seeks primarily to amuse, while the teacher's first object is to instruct. Such a statement, however, would convey only a partial truth: the novelist seeks to amuse his readers, in the sense of *interesting* them; while the teacher's aim also (or part of it) is, while he instructs, at the same time to *interest* his pupils. The common point in the aim of teacher and novelist is, that each strives to interest those whom he addresses. One of the chief requirements criticism makes of the modern novelist is that his work should possess a certain quality of attractiveness—quite the unpardonable sin in this form of art is dulness: it matters not what serious and solid qualities of intellect a writer may display, if he fails to enlist the attention and sympathies of his readers throughout, it is understood that he has failed to write a good novel. The teacher of to-day is in a very similar position: he is expected not only to instruct but also to interest his pupils: no matter how wide may be his learning or how exact his scholarship, it is understood that if he fails to gain his pupils' attention and interest in a lesson, *ipso facto* he has failed to give a good lesson.

And the reason why this quality is deemed so essential is the same in both cases. We take an interest only in the things that appear *real* to us: hence if a novel excites the interest of its readers, or if a lesson stimulates the interest of those who hear it, it is because the subject-matter of each has been made to appear vital and real. The art of a teacher, no less than that of a novelist, is displayed in the life with which he infuses his subject. The novelist, acting up to his name, may describe scenes and situations that are novel to his readers: the scene of his story may be laid in some comparatively unknown region of the earth, or he may even depict some Utopia imagined by himself; yet, if he is to interest his readers, the subject-matter must be made to appear in some sense real to them. So, too, with the teacher: his task may be to introduce an aspect of experience that is strange to the pupil, and his skill as a teacher is shown in the degree of vitality and interest with which he invests the subject.

The teacher resembles the novelist also in the fact that he frequently appeals to what have been called the "native," as opposed to the "acquired," interests of his pupils. This is more especially the case when he is teaching young children, who have few or no "acquired" interests; and it is to be noted that the "native" interests of young children are in large measure the same interests as those to which the novelist (and especially the romantic novelist) appeals in his readers. A passage that illustrates this point occurs in Professor W. James's *Talks to Teachers on Psychology* (p. 97), where it is stated that "living things, moving things, or things that savour of danger or of blood, that have a dramatic quality—these are the objects that are natively interesting to childhood, to the exclusion almost of everything else; and the teacher of young children will keep in touch with her pupils by constant appeal to such matters as these." Of the romantic novelist, too, it may equally well be said that he keeps in touch with his readers "by constant appeal to such matters as these": in what material do Scott and Dumas and the whole tribe of the romanticists deal, if not in "living, moving things, that savour of danger or of blood, that have a dramatic quality"?

Further, there are certain devices that a novelist may use in order to produce a sense of reality in his reader's mind, and thus to create interest. One of the chief of these devices is the use of "local colour": the introduction of "dialect," for instance, or of minute descriptive touches, increases the reality of a scene for a reader. And this device the teacher also uses—especially when he is teaching young children. Every teacher knows how he frequently illustrates his lessons by references to the things and places and circumstances amid which his pupils live; and the effect of the "local colour" thus introduced is the same as when it is used by the novelist: it makes a lesson more vivid and real to the pupil.

It is thus seen that there is a general resemblance between the teacher and the novelist in the circumstance that both practise an art, and that also there is a common point in the aim that they pursue—both seeking to stimulate interest and create a sense of reality in the minds of those whom they address. It has been shown, too, that the interests to which they appeal are sometimes the same. Furthermore, if we consider the art of teaching and the art of novel-writing from a historical point of view, they are seen to resemble one another in the circumstance that both are, comparatively speaking, of recent origin—essentially products of the latter half of the nineteenth century. This statement, it should be noted, does not mean that there were no novelists, and that there were no writers on Education, or teachers who regarded their calling as an art, before the nineteenth century. We know, for instance, that Ascham's *Schoolmaster* was published in 1568, and that eleven years later the first part of Lyly's *Euphues* was published: the one an important contribution to pedagogic literature, and the other a notable contribution to the literature of the novel. But these

were mere beginnings, and they were beginnings that did not develop rapidly. It was not till the nineteenth century that the novel became the most popular of all the forms of art, and that—relatively speaking—a wider and a more intelligent interest in Education manifested itself. The historian who may make it his task to describe the intellectual life of our country during the nineteenth century, will surely include among the most prominent characteristics of the period this predominance of the novel as a form of art, and this increased interest in, and attention to, the claims of Education. And these two movements are closely interrelated: not only do they coincide in time, they are also connected with one another casually. Both are based on a common feature of the intellectual life of our times—on a generally-felt need for the widening of our interests in life. Thus the modern novelist may take for his theme almost any form or aspect of existence that he may please: no subject is excluded from his domain: the only demand that is made of him is that he should interest his readers. In Education, again, the generally-felt need for the widening of our interests has found expression in a modified conception of the aims and methods of teaching. The teacher of to-day is actuated by a far wider aim than that which moved his predecessor of sixty or seventy years ago: he seeks to develop the whole nature of his pupils, to prepare them for "complete living"; and his methods must be in harmony with his aim—they must not be dry and mechanical, but must be in close relation to his pupils' lives. Just as a modern novel must appeal to its readers with a sense of living reality, so too the essential characteristic of teaching, as it is now conceived, is that it should be real and living—something vital to the pupil.

It is thus seen that a comparison between the work of the teacher and that of the novelist possesses a real significance, setting forth as it does in a fresh light typical modern views regarding the aim and methods of teaching.

ASTRONOMICAL WORK.

IN the report presented to the board of visitors of Greenwich Observatory in June 1903 the Astronomer Royal stated the result, subject to possible small alteration, of a determination of the difference of longitude between Greenwich and Paris Observatories made in the previous year by two of his staff. It was also mentioned that a similar measurement had been undertaken at the same time, but quite independently, by two observers from Paris, and at a recent meeting of the Paris Academy of Sciences, M. Loewy, Director of the National Observatory, exhibited the result derived from the French work, which proves to be in excellent accord with that found by the English observers. The difference was only about three-hundredths of a second, and that on a total of 9 min. 20·974 sec. That is to say, Paris stands on a meridian which is east of the meridian of Greenwich to the extent that its noon is 9 min. 20 sec. and 974 thousandths of a second earlier than the noon of Greenwich.

It is very remarkable that the mean of these figures agrees almost exactly with the mean of the results of similar determinations made in 1888 and 1892, which differed considerably between themselves. Mr. Loewy feels justified, therefore, in saying that in his opinion the value obtained in 1902 establishes precisely and definitely the difference of longitude between the two fundamental meridians of Greenwich and Paris. The close agreement is proof of splendid exactitude on the part of both French and British workers.

THE DISAPPEARING LAKE.

THE Elder-Dempster liner *Sokoto* arrived in Liverpool the other day from West and South-West Africa, including the river Congo. Two French naval officers—Lieutenants Andoin and D'Adhamar—embarked on the *Sokoto* at Forcados, after a trip to Lake Tchad. The two officers started from Brazzaville, in the French Congo, and travelled overland to Lake Tchad, returning by way of the British Nigerian colonies along the Berne River. The journey occupied eighteen months, and was mainly undertaken to verify the report of Captain L'Enfant of the existence of a waterway from a certain point to Lake Tchad. The explorers were unable to discover the waterway in question, and consequently could not confirm the report of Captain L'Enfant. They had with them some native soldiers and a few carriers, but they did not meet with any serious opposition during the journey. They were greatly disappointed with the country, particularly in the neighbourhood of Lake Tchad, the region traversed being mainly mud and sand—a barren waste hundreds of miles in extent. The lake itself was particularly disappointing in this respect, and it was found that the water was gradually disappearing. It was computed that the water is becoming five inches shallower every year, and it is only a question of a few years before Lake Tchad will be dried up. At present the water has receded some distance from its banks.

CO-ORDINATION IN EDUCATION.

AT the distribution of prizes at the Borough Road Polytechnic the chairman announced that at the recent examinations conducted by the City and Guilds of London Institute the Borough Polytechnic obtained nearly one-third of the 64 medals awarded to London institutes, or more than twice the number gained by any other institute in London. Among the additions to the classes was one for the teaching of waistcoat making to girls, which was essentially a women's trade, was skilled, and highly paid. Mr. Thesiger said the London County Council was often charged with wanting to have all things placed under its care, but one thing he hoped they would not attempt to get too firm and exclusive a control of was those great polytechnics. While they had to find the funds for them, it was necessary that they should have some control, but it would be a deplorable thing if they were to attempt to manage them entirely from their central office. Under the new order of things there was an opportunity which they had not had before of co-ordination in education, and he had a scheme in his mind which he hoped would be put into force next Session. That was to attach definitely to the polytechnics and technical institutes some of the commercial or science and art classes of the evening schools, as branches of the bigger institutions, to have an interchange of the staffs in order to remove certain prejudices, and thus make the evening schools feeders of the branches, and the branches feeders of the polytechnics and technical institutes.

The Practical Infant-School Teacher.

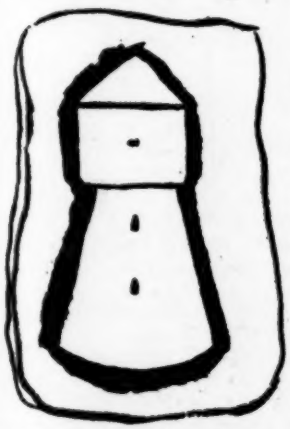
SUGGESTIONS FOR CARRYING OUT THE OCCUPATIONS IN CONNECTION WITH THE CORRELATED SCHEME OF WORK FOR AN INFANTS' SCHOOL.

March, Week I.

Clay Modelling.—The windmill is best modelled in three parts.

Divide a piece of clay as follows:—(1) the largest piece for the lower part; (2) a rather smaller piece for the cube-shaped part; (3) a piece smaller still for the pyramid-shaped top.

One attempt at modelling this will very quickly give an idea of the proportions required, so that the teacher is strongly advised to try it beforehand should she be about to take it with a class of children.



WEEK I.—CLAY MODELLING: WINDMILL.

Roll the largest piece into a ball, and from this obtain the cylinder. By rolling one end of the cylinder slightly, cause it to taper somewhat towards the top, then flatten it so that it is ready to hold the cubic form.

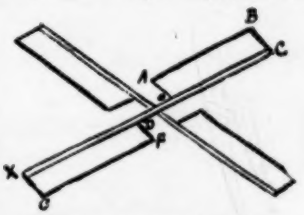
Make the cube by obtaining first the cylinder, and then from that the cube. This may be done by flattening six sides by means of gentle taps on the board. Place this, as shown in the illustration, on the cylindrical form. If the proportions are correct it should project slightly. The pyramid top is best made by modelling a cube out of the smallest of the three pieces of clay and cutting it diagonally. This will give two square pyramids. Set one on the top of the cube, and with the exception of the sails the model is complete. Prick some small holes for windows. The sails may be added with paper, as shown in the illustration for paper cutting. Another way of making a paper windmill (so called) is doubtless well known to all teachers, and need not be described here.

Brush Painting.—This is an exercise in the direct use of the brush, and is given here as a rather more advanced lesson to follow on the January one of a branch of the tree, and because in this month a touch of green may be introduced, supposing the trees are near budding-

WEEK I.—BRUSH PAINTING: TREE.

time. Use Vandyke brown. Paint the thickest strokes first, and add the more feathery ones afterwards, and a suggestion of green if desired.

Paper Cutting.—This may be cut from two squares of paper, or it may be drawn first and then cut out. If cut *directly*, take 1 and 3 together and 2 and 4 in this way. Take a square of paper, and fold vertical and horizontal lines to mark the centre. Open out, and beginning at X, along one of the folds, cut to O; turn at right angles and cut to A; turn at right angles again, and cut straight off at B. Begin again at C, and cut the reverse way back again, first from C to D, turn at right angles to F, then cut off at G. Cut 2 and 4 similarly. A good diagram of this should be put on the blackboard. It is not difficult provided you are not dealing with a very large class, and is worth attempting. It is an excellent exercise in the use of the scissors and in carefulness. If cut through at the centre it is spoilt. You are, however, advised not to make the centre part too thin.



WEEK I.—PAPER CUTTING: SAILS OF WINDMILL.

Crayon Work.—This may be made into a pretty picture with a little variety of colour—blue water, brown sails, yellow or green boat. Reproduce by means of the copier. Draw it on the blackboard, and demon-

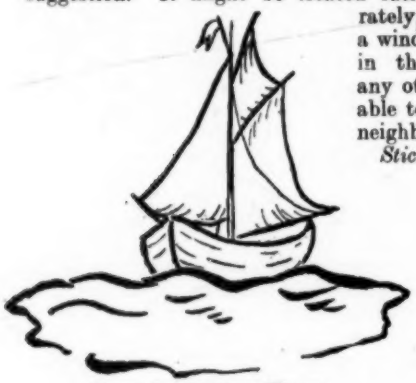
strate from that. Be careful to bring out the connection between the lesson on the wind and the use of the sails of the boat.

Blackboard Drawing.—The illustration given is a mere suggestion. It might be treated rather more elaborately, with perhaps a windmill and house in the distance, or any other details suitable to the individual neighbourhood.

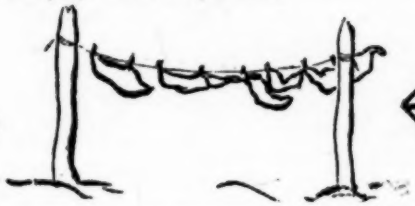
Stick Laying.—Two lengths of sticks are needed for this. The children should sort them into separate lengths. Have the stick picture made on slates, so that you may reward the industrious ones by adding some touches in chalk for the sake of encouragement.

keep turning the object round and round, so that the side is equally pressed out all round. Be careful to keep the sides vertical. In this lies the essential difference between the present object and a bird's nest. When it is sufficiently hollowed, take small pieces of clay and model the handles, as shown in the illustration, and with a pointed slate pencil make the lines indicated on the outside of the tub.

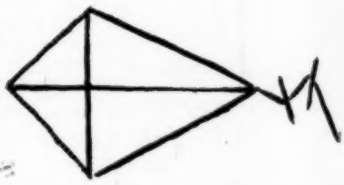
Brush Painting.—An exercise in drawing with the point of the brush. Vandyke brown would be a suitable colour. First draw the closed umbrella, and then the open one.



WEEK I.—CRAYON WORK: BOAT ON SEA.



WEEK I.—BLACKBOARD DRAWING: CLOTHES ON LINE.



WEEK I.—STICK LAYING: KITE.

Crayon Work.—This is an easy exercise, but, if possible, let the children choose their own colours. It will cause considerable pleasure, and as a means of presenting an opportunity of choice to the child has as well a psychological value. It is rare when children exercise independence of judgment, but we may help the power to do so in many simple ways such as this.

WEEK II.—CLAY MODELLING: WATER TUB.

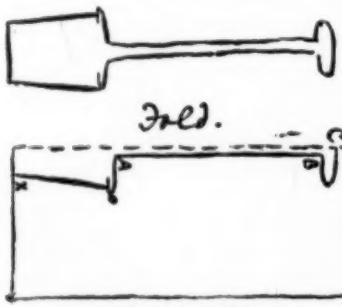
WEEK II.—BRUSH PAINTING: UMBRELLA.

WEEK II.—CRAYON WORK: UMBRELLA.

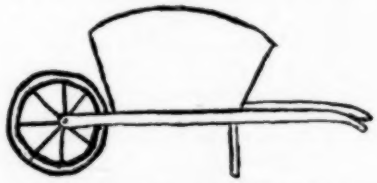
March, Week II.

Clay Modelling.—Take a good-sized lump of clay, and roll into a ball. By pressure with the thumbs and fingers depress the centre as you would when modelling a bird's nest. Keep the clay upon the modelling board, so that one side becomes flat; and whilst working the thumbs and fingers in the depression,

Paper Cutting.—Take a square of paper and fold in half. The dotted line is the fold of the paper. Begin to cut at X. Cut upwards to O, slanting slightly outwards, then turn at right angles and cut to A; turn again at right angles, and cut upwards for the handle to B. Form the somewhat rounded handle, and cut off at C.



WEEK II.—PAPER CUTTING: SPADE.

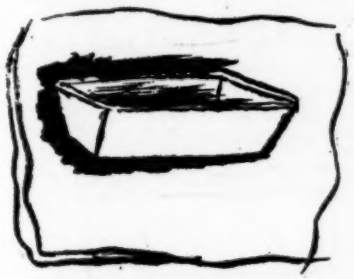


WEEK II.—BLACKBOARD DRAWING: WHEELBARROW.

WEEK II.—STICK LAYING: WINDOW BOX.

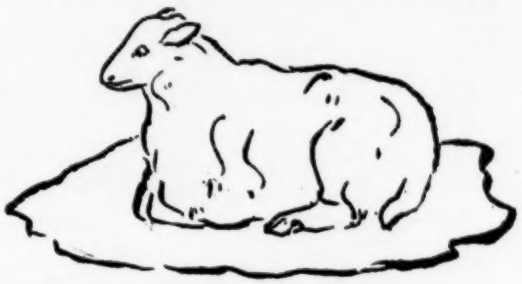
Blackboard Drawing.—A good beginning to a lesson of this kind would be to ask for a description of a wheel-

barrow from memory. The shapes are, of course, various, and as the introduction of one into the class-room is impracticable, the teacher is advised to make a drawing first herself on the blackboard, so that the finished object may be seen as a whole, and then proceed to take each line and build up the picture gradually with the children.



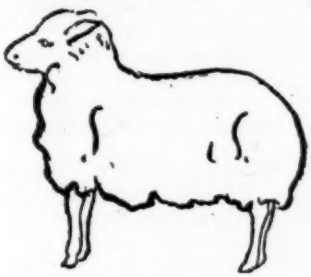
WEEK III.—CLAY MODELLING: TROUGH.

WEEK III.—BRUSH PAINTING: TURNIP.



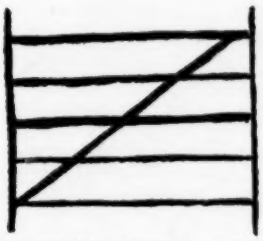
WEEK III.—CRAYON WORK: SHEEP.

Stick Laying.—Three sizes of sticks are required for this object. Call attention to the general shape—an oblong—and comment on the zigzag at the top.



WEEK III.—PAPER CUTTING: SHEEP.

WEEK III.—BLACKBOARD DRAWING: TURNIP.



WEEK III.—STICK LAYING: HURDLE.

March, Week III.

Clay Modelling.—This is best modelled from the cylinder. Obtain it from the sphere, then proceed to hollow it out as in modelling the tub; the hollow need not be as deep, however. The sides of the trough need not necessarily be vertical; they are, in fact, most frequently rounded, as in a cylinder. A rough trough is often made from a tree trunk; those placed in fields for sheep are sometimes on legs to raise them slightly from the surface of the ground. Do not use a tool in modelling if you can avoid it; the fingers are the best tool, and should be used as much as possible.

Brush Painting.—Unless your class is small, and you are able to deal with a variety of colours easily, you are advised to have this done in sepia. Have the turnip outlined with the brush point, then deal with the upper part, putting on a pale wash of sepia, carefully representing the stalks at the top by means of brush strokes. When dry, take some rather thicker paint, and treat the top as in the blackboard drawing illustration. If you are able to give two or more colours to your children, a dark purple shading to yellowish green will do for the wash, with a good green for the stalks.

WEEK IV.—CLAY MODELLING: MILK PAIL.

WEEK IV.—BRUSH PAINTING: CLOVER.

WEEK IV.—CRAYON WORK: COW.

Crayon Work.—Yellow will be the best colour to use for this, with a very few touches of brown for a finish.

It is, of course, intended for reproduction by means of the copier, but the teacher should draw it on the blackboard, and work with the children while the filling in process is carried out.

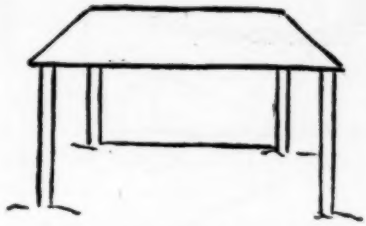
Paper Cutting.—This should be drawn first, and then cut out. Be careful to give the ragged appearance underneath, and with a crayon or lead pencil introduce a few lines for eyes, ears, and so forth.

Blackboard Drawing.—Draw the root first. The symmetrical look of the turnip makes it a good hand and eye exercise. If convenient, the leaves may be drawn with green chalk. It will add to the appearance of it, and give pleasure to the children, a point often neglected.

Stick Laying.—Vertical, horizontal, and oblique lines are here joined to represent an object. It is an opportunity of showing how they supplement and complement one another.

WEEK IV.—PAPER CUTTING: CLOVER LEAF.

WEEK IV.—BLACKBOARD DRAWING: MILKING STOOL.



WEEK IV.—STICK LAYING: COW SHED.

March, Week IV.

Clay Modelling.—The method described for modelling the water-tub, Week II., may be followed in the present exercise. On the milk-pail there is only one handle, and that rather longer than those on the tub. It should be continuous with the tub, and not have the appearance of being put on.

Brush Painting.—This makes an exceedingly pretty exercise, but needs some care. The colours required are crimson lake, with a slight touch of blue in it, and green. Paint the stalks green first, and then the flower reddish-purple. The clover is best represented by making slight touches with the brush close upon one another. Be careful to keep the round form of the flower. Paint the bud, but this will only show red at the top. The lower part representing the bract should be green, and can be painted when the leaf is done. Paint the leaf as represented in the illustration, and add the green underneath the flowers.

Crayon Work.—Reproduce this by means of the copier, and give each child a copy to fill in. Brown would be a suitable colour. Draw it on the blackboard, and demonstrate for the children.

Paper Cutting.—This should be drawn first, and then cut out; it gives some good curves. Be careful about the slight indentations at the top of the leaves. It may also be cut from a folded piece of paper, as it is quite symmetrical.

Blackboard Drawing.—This will afford excellent practice in drawing the oval. Give the children five minutes first of all to get into a good swing in drawing the oval with one sweep. The legs are easily added.

Stick Laying.—Three lengths of sticks are required for this. Have them sorted into their respective lengths, then proceed to draw the object on the blackboard, and explain to the children what you are doing. After this demonstrate the laying of the sticks to form the required picture.

ROYAL COLLEGE OF SCIENCE AND ROYAL SCHOOL OF MINES, SOUTH KENSINGTON.

THE President of the Board of Education has appointed the Right Hon. R. B. Haldane, K.C., M.P., to be chairman of the Departmental Committee which is inquiring into the present and future working of the above-named institutions, in place of Sir Francis Mowatt, G.C.B., late Secretary to the Treasury, who, while remaining a member of the committee, has resigned the chairmanship owing to complications having supervened on his illness which were not previously anticipated.

The committee is now therefore constituted as follows:—The Right Hon. R. B. Haldane (chairman); Sir W. de W. Abney, K.C.B., F.R.S., formerly Principal Assistant Secretary, Board of Education, South Kensington; Sir Edward H. Carbutt, Bart., member of the Council of the Iron and Steel Institute, and Past President of the Institution of Mechanical Engineers; Sir William S. Church, Bart., K.C.B., President of the Royal College of Physicians; Hennen Jennings, Esq., President of the Institution of Mining and Metallurgy; A. H. Leech, Esq., member of the Lancashire County Council, and of the Lancashire Joint Advisory Committee on Mining; Sir Philip Magnus, Superintendent and Secretary of the Department of Technology, City and Guilds of London Institute; Sir Francis Mowatt; F. G. Ogilvie, Esq., one of the Principal Assistant Secretaries of the Board of Education; Lord Reay, G.C.S.I., G.C.I.E.; Sir Arthur W. Rücker, F.R.S., Principal of the University of London; Sidney Webb, Esq., member of the London County Council; Julius C. Wernher, Esq., one of the trustees of the Bessemer Memorial Fund; and Sir William H. White, K.C.B., F.R.S., late Director of Naval Construction, and late President of the Institution of Civil Engineers, with J. C. G. Sykes, Esq., one of the Assistant Secretaries of the Board of Education, as Secretary, and F. E. Douglas, Esq., Board of Education, as Assistant Secretary.

It will be remembered that the terms of reference to the committee are as follows:—"To inquire into the present working of the Royal College of Science, including the School of Mines; to consider in what manner the staff, together with the buildings and appliances now in occupation or in course of construction, may be utilised to the fullest extent for the promotion of higher scientific studies in connection with the work of existing or projected institutions for instruction of the same character in the Metropolis or elsewhere; and to report on any changes which may be desirable in order to carry out such recommendations as they may make."

Our Modern Language Section

FRENCH PRIZE COMPETITION.

RULES.

1. All translations should be **posted not later than March 8, 1905**, and addressed:—PRIZE EDITOR, Office of the *Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

Mais c'était surtout aux heures de repas, qu'elle n'en pouvait plus, dans cette petite salle au rez-de-chaussée, avec le poêle qui fumait, la porte criant, les murs qui suintaient, les pavés humides; toute l'amertume de l'existence lui semblait servie sur son assiette, et, à la fumée du bouilli, il montait du fond de son âme, comme d'autres bouffées d'affadissement. Charles était long à manger; elle grignotait quelques noisettes, ou bien, appuyée du coude, s'amusait avec la pointe de son couteau, à faire des raies sur la toile cirée. Elle laissait maintenant tout aller dans son ménage, et Mme. Bovary mère, lorsqu'elle vint passer à Tostes une partie du carême, s'étonna fort de ce changement. Elle, en effet, si soigneuse autrefois et délicate, elle restait à présent des journées entières sans s'habiller, portait des bas de coton gris, s'éclairait à la chandelle. Du reste, Emma ne semblait plus disposée à suivre ses conseils; une fois même, Mme. Bovary s'étant avisée de prétendre que les maîtres devaient surveiller la religion de leurs domestiques, elle lui avait répondu d'un œil si colère et avec un sourire tellement froid que la bonne femme ne s'y refrotta plus. Emma devenait difficile, capricieuse. Elle se commandait des plats pour elle, n'y touchait point; un jour ne buvait que du lait pur et le lendemain des tasses de thé à la douzaine. Souvent elle obstinait à ne pas sortir, puis elle suffoquait, ouvrait les fenêtres, s'habillait en robe légère. Lorsqu'elle avait bien rudoyé sa servante, elle lui faisait des cadeaux ou l'envoyait se promener chez les voisines, de même qu'elle jetait parfois aux pauvres toutes les pièces blanches de sa bourse, quoiqu'elle ne fût guère tendre cependant, comme la plupart des gens issus de campagnards, qui gardent toujours à l'âme quelque chose de la callosité des mains paternelles.

GUSTAVE FLAUBERT.

RESULT OF THE FEBRUARY COMPETITION.

The prize is awarded to "Bees." (Will "Bees" kindly forward name and address for publication?)

First Class.—Robin, Agaznog, Shakspere, Baldur, Fezz, Trente-et-un, Bonne Aventure, Betty, Choftie, Annie, Irene, Furnessian, Beachie, Sorbonne, D.J.E., Dunkeld, Sweetbrier, E.S.L.A., Little Billy, St. Regulus, F.M.S., La Printanière, St. Serf's, Nosgop, Adlitam, Dijon, Gawayr Ten, Bea, Zita, Jean, Marguerita, Awa Maru, Ecuyer, Oliver Cromwell, Personne, Dot, Le petit caporal, J.P.B., Vingt-et-un, Nehemiah, L.S.B., Les Haies, Cæsar, N. 5906, Jabberwock, Odd number, Renée, Ruby, Expansive, Theodore Vincent, Shamus O'Crackle, Summerbank, Grimbarian, Bracebridge, Cinq-Mars, A.B.C., Lychnis, Fils d'Adam, Clio, Co-operator, Mr. Micawber, Gipsy, Whymark, Kathleen.

Second Class.—Denise, Mannie, Cardiff Higher, Rosamund, Fido, Pegotty, Rosamund (B), Dunhevedian, Eleanore, Sheila, Withdeane, Beauty, Dollakin, A.S.H., Guinevere, H.R.N., Une anglaise, L'Écolière, L'Écolière (B), M.P.R., Katze, Snowdrop, Gorgon, Guillaume X., Lama, Somerleigh.

Received too late.—C.E.M., Guillaume, Cicero.

The names and addresses of those who gained the last two prizes are: "Pananka" (December), Thomas Rawlinson, 25 Dorset Road, The Brook, Liverpool; "Dijon" (January) Edith A. Charlesworth, 24 Lowman Road, Holloway, N.

Report.

The number of really good translations sent in is very gratifying. The idea running throughout the piece was well grasped, and the only faults at all general were the failure to understand the meaning of *dire* in *je le dis*, &c., and *fidèle* in the sense of "one of the faithful," "one who believes." One candidate in a note points out that M. Barrès has imperfectly grasped Loyola's meaning in the passage quoted. We do not, of course, hold ourselves responsible for any opinions expressed in the extracts set. Our aim is to set pieces which shall be patterns of good French style, interesting and suggestive, and we thought that the light and easy, but not irreverent or flippant, treatment by M. Barrès of a theme of perennial interest to humanity deserved to rank in the collection of specimens of French literature appearing in our columns.

Prize Translation.

Some of my friends in the political world have assured me that in these latter days the enthusiasts of our race—understand me to refer to religious enthusiasts—find their greatest delight in making proselytes. They were occasionally in the habit of shutting up in a red-hot iron cage persons holding materialistic views. In this cage the materialist was compelled to shift rapidly from one foot to the other till he saw fit to alter his conception of the universe. In a similar way, the Deity still deals with us in the present day to make us idealists. Our high conception of the problem of life arises from our continual unrest. We do not know on which leg to dance. Persistently to follow after peace and happiness with the settled conviction that we shall never attain them—that, it seems to me, is the complete solution of the problem. We must place our felicity in the efforts we make, not in the results we may expect to follow from them. Let us derive pleasure from the means, neglecting entirely the end. I have often thought, that, above all men, Ignatius

de Loyola has shown rare genius, and I call him the Prince of Psychologists, because at the very end of his "Spiritual Exercises" (a set of rules, regulations, and instructions for securing soul-calm), he has these words:—"And now what the true believer has to do, is simply to do it all over again from the beginning." Good! Capital! Delightful! You struggle for months to find happiness, you think you have secured it; at the moment when you long for it so eagerly and you have it almost within your grasp; well! begin at the beginning again. Let us dream our dreams each morning, but let us be aware that they shall come to naught. Let us be burning with expectation, frozen with doubt. It is quite a simple matter with the easy-going temperament we all have nowadays. BEES.

ON THE STUDY OF GERMAN.

VIII.

HAVING now dealt with the most characteristic points in the accidence and syntax of German, we must consider the case of the student whose ambition is to be able to write as well as to speak German. Supposing him to have made a careful study of the grammar, how should he further direct his studies so as to be able to express his thoughts in German? Books professing to teach German composition will do something for him, but above all, he can help himself by varied and careful reading. If he wishes to use his German for commercial letter writing, a study of some of the excellent manuals which now exist will furnish him with the equivalents of English commercial terms. Even in this case he should keep up his reading of general literature, which will help to build up in him ease and fluency of expression. Reading the market reports in German newspapers will help to exercise him in the knowledge he has acquired, and will no doubt give him much information of use to him in his own particular sphere.

The construction of the complex sentence in German needs to be thoroughly mastered before the student can be left to his own initiative, but its peculiarities will become quite natural to him if he continues his reading. The student should remember that the tendency in German literature is now to make the sentences less involved than formerly, and he should accordingly make his sentences as little involved as possible.

With regard to the choice of words, it is always a great temptation to an English student to use classical words where a German would use words derived from native sources. For example, *präpariren* would be likely to suggest itself as an equivalent for "prepare," but *vorbereiten* is better and more German. Again, *exercieren* is used in German, and in some special applications is probably the better word, but *üben* is more German, and will, generally speaking, be the better translation for "exercise."

In our next paper, which concludes the series, we propose to sketch out a course of reading in German, and to suggest works which the general reader may study with profit and enjoyment.

(To be continued.)

PENNY BANKS IN SCHOOLS.

The following valuable circular to Local Education Authorities has been issued by the Board of Education on this subject:

8th February, 1905.

SIR,—The Board of Education think that the establishment of new Local Authorities for Education throughout the country affords a fitting opportunity for once more calling attention to the importance of the encouragement of thrift amongst the children of Elementary Schools, and to the practical assistance given to this aim by the establishment of Penny Banks. The Board are encouraged to take this step by the great success which attended the issue of similar circulars in July 1881 and October 1891.

To teach a child how to economise slender resources, how to resist temptation to needless expense, and how to make reasonable provision for the future, is an important part of its education. Such knowledge cannot be acquired too early in life, and much may be done in a school to render its acquisition easy to children and to show them the advantages of economy and foresight. Simple lessons, intelligible and interesting to the children, may be given on money, on the conditions which affect the rate of wages, on the relation of skill, prudence, and knowledge to industrial success, and on the right methods of spending and saving. Economy is, however, a habit, and is to be acquired by practising it, rather than by listening to demonstrations of its importance. The child who is helped to deny himself some trifling personal gratification, who is encouraged to save by degrees a few shillings, and who finds this sum available for the purchase of books or clothes, or for helping his parents at a time of family misfortune, has received a practical lesson in the advantages of economy and foresight which may make a lasting impression upon him.

The value of such a lesson will not be confined to its influence on the scholar's own character and welfare: it will exercise a reflex interest on the whole household to which he belongs. It provides them, too, with a practical lesson of lasting value. It will tend to encourage the parents to start Savings Bank accounts themselves, or to assist their children's.

The Board are fully aware that Penny Banks, or other Savings Banks, have already been in existence for a long time in connection with a large number of Elementary Schools, and that Provident Clubs of various kinds exist in connection with many others, but there are still many where nothing of the kind exists. The Board have no desire to interfere with any existing plans which have been found to work well. Every expedient which encourages economy and forethought has its educational advantage. But temporary devices, such as Shoe Clubs, have the disadvantage that they do not continue after the want is once satisfied. What is rather to be desired is that children should be encouraged to save in view of *any* future contingency.

The Board desire, therefore, to call particular attention to the special facilities offered by the Post Office for the establishment of Penny Banks in schools. Such Banks, when formed, may readily be placed in connection with the Local Savings Bank Office. Small books are issued gratuitously for the use of children, and the necessary rules, which are few and simple, are printed in them. Ledgers for the keeping of the accounts of the School Bank are also provided gratuitously. Facilities, too, are provided for saving penny by penny by postage stamp slips. Full particulars of the various facilities offered are contained in the enclosed Post Office circular on the subject.

The Board, while fully aware of the services which the teachers may render, are unwilling to cast upon them any additional labour and responsibility. The management of a School Savings Bank offers an opportunity for the voluntary help of the Managers or any other persons interested in the welfare of the school, and it should generally be found possible to conduct it through voluntary agency without trenching on the time and energies of the teacher. The Board believe that they can rely with confidence on the goodwill of the Local Authorities and the School Managers in assisting to make the necessary arrangements for schools where Banks do not already exist.

The Board feel no hesitation in making this appeal to Local Authorities and all others interested in Elementary Schools, because they are certain that the more general adoption of such a plan will increase the usefulness of the Elementary School as an instrument for the formation of character, and because they have every reason to believe that the keen interest which has been shown in the past by all concerned will continue and spread in the future.—I have the honour to be, Sir, your obedient servant,

H. M. LINDSELL.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Late Principal of the Belvedere Pupil Teacher Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

NEW SCHOLARSHIP COURSE FOR DECEMBER 1905.

Third Month—March.

Work to be Prepared.

1. *Reading and Repetition.*—No pains should be spared to make these exercises as near perfection as possible. Diligent study of the text and regular oral exercise are essentials to success. Pronunciation must be absolutely correct, the initial and final consonants receiving their full share of attention, without being unnecessarily laboured. Any passage which presents difficulty should be repeated several times till the difficulty is eliminated.

2. *Teaching.*—Chap. iii., *Scholarship School Management.*—*Teaching Aids.*

The term "Teaching Aids" may be applied to all contrivances, other than books and the voice, which enable the teacher to bring facts home to the minds of the children in the most emphatic and clear form. They tend to counteract the haziness and "woollen-mindedness" which is a too common feature in education, and which arises from the fact that the teacher is appealing to the imagination. As this faculty is not well developed in young children and is very difficult to direct, it is evidently better to supply some definite information which appeals rather to the presentative faculties, especially the eye. A good picture of an animal will of itself teach more than the most animated description. As a proof of this one has only to consult the rough drawings of foreign animals by some of the early book illustrators, who, though supplied with an accurate description, fail entirely to produce any more than a grotesque caricature. Educational publishers, inspired in all cases by expert teachers, have given this subject great attention of recent years, and not only are beautiful and correct pictures and models abundant, but in many cases the actual object may be obtained for a comparatively trifling cost.

A good collection of teaching aids forms a very necessary part of the equipment of every school.

But still the efficiency of such apparatus rests with the teacher. Clear description is not so good as diligent questioning, and the mere acquisition of facts must be supplemented by reasoning and judgment, *e.g.*, The elephant has a short neck—why? The giraffe a long one—why? and so on.

In geography, maps, plans, and pictures tend to make the subject an entrancing one. It is a species of travelling, and produces all the joys of travelling.

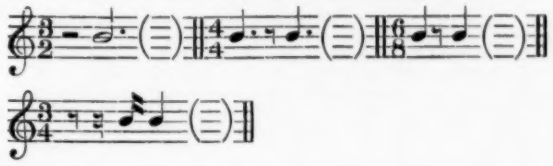
A few words must be given on "experiments." With elementary science becoming such an important branch of school work (and properly so), it behoves the teacher to take care to use the experiments in the best possible way. The class must be trained (1) to observe closely, and (2) to reason correctly from what is seen. An experiment that simply causes a noise and produces a startling result is of little use.

3. *Drawing.*—Two copies each week. Some of the specimens submitted to me are very crude and incorrect. This, I think, arises from the students attempting a complex copy before they are at home with simple lines and curves. A few minutes' daily practice in spirals in different positions would produce much better work. I would also advise beginners to construct spirals with their compasses, and then copy them freehand. Another very good test of eye and hand is to draw a circle. The eye, being well trained in this geometrical shape, at once recognises the defects, which in another copy may be hidden by foliage, etc. Study and copy accurately from nature the shape and proportions of leaves, flowers, &c.

4. *Music.*—The value of notes, dotted notes, and rests. Bars and time signatures. Transposition of time.

The text-book will give all the information necessary on these points. The following questions have all been set in the Scholarship Exam.

(1) Complete each of the following bars by adding one note at the end.

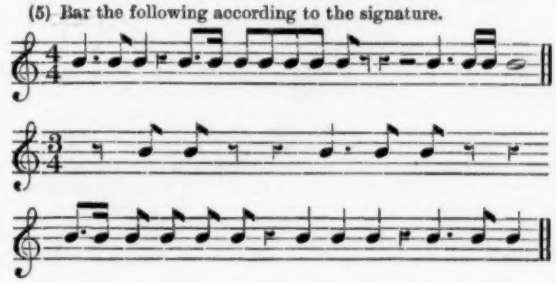


(2)

(3) Rewrite the following in $\frac{3}{8}$ time, halving the value of every note and rest.

(4) Rewrite the following in $\frac{4}{4}$ time, halving the value of every note and rest.

(5) Bar the following according to the signature.



(6) Rewrite in $\frac{4}{4}$ time, and again in $\frac{4}{8}$ time.

5. *Penmanship.*—Write a page daily in the *Practical Teacher* Copy Book. Continual care must also be taken with the subject—usually a very weak one.

6. *Composition.*—Write one or two essays each week on such subjects as—

(*a*) Museums and their uses.
(*b*) Some uses of the electric telegraph.
(*c*) Emigration.
(*d*) Fruit trees.
(*e*) Tragedy and comedy.
(*f*) Henry V.'s campaign in France.
(*g*) "One crowded hour of glorious life is worth an age without a name."
(*h*) Example is better than precept.

The subject must be read up if not sufficiently known to you. When you have amassed sufficient ideas arrange them in logical order, write out a skeleton plan, and then proceed to clothe in your best language, revising and improving till it is your very best.

The following suggestions may be of some service.

(*a*) Define a museum—a collection of specimens labelled and arranged so that they are easy of access and reference.

Some museums are general in character, others devoted to one particular branch of study—physiology, art, geology, natural history, &c.

Point out the uses to students and the general public.

(*b*) This should be comparatively easy. One has only to imagine all the telegraph wires and cables suddenly cut and picture the results on newspapers, trade and commerce, &c., to appreciate the most important part which the telegraph plays in modern life.

(*c*) Define carefully. Trace the causes—explain the means by which it is carried on, the results to the mother-country and the new. Discuss the classes of people who should emigrate.

(*d*) One of Nature's gifts—some giving spontaneously, others only after labour is expended on them. Compare the luxuriant production of the Tropics with the meagre supply in the Temperate Zone. Most of our common fruits have been produced by careful training and improvement, *e.g.* the apple from the wild crab, the plum from the wild sloe, &c. Point the importance of fruit as a food.

(*e*) A tragedy is a play based on the old Greek ideals of an adverse fate pursuing a man. It was given originally as a public warning that if the anger of the gods were incurred by some wrong or unwise act, the punishment was inevitable. "The mills of God grind slowly, but they grind exceeding small." The masterpieces of Æschylus and Sophocles exhibit this. In tragedy the heart is moved to pity. A comedy exhibits the misfortunes of a man as a means of provoking the mirth of the onlooker. The mistakes arising from mistaken identity or from being placed in an awkward position are frequently the basis of the action.

(*f*) This may be read up from the text-book of the play, or from a good History. It should be thoroughly known.

(*g*) This statement is open to much discussion. If the "crowded hour" is filled with events which tend to the good of humanity at large, or a nation in particular, it may be true. It certainly is given to a few to achieve brilliant fame by some deed which takes a very brief time, but it is given to all to live a "life without a name," which may nevertheless be quite as useful as the other. Argue the question from both sides.

(*h*) Of this there is *no* doubt. Imitation and mimicry is a powerful factor in our lives, although we may be unconscious of it. When a child sees a teacher write a copy, there is a powerful stimulus to do the same, and so on in all phases of life. "He has done a thing—why should not I?" A child is more prone to copy the mannerisms of the parents than to follow their advice, especially if the latter be antagonistic to their practice.

I shall be glad to criticise occasional essays sent in by students.

7. *English.*—(1) Learn the Greek Prefixes, and fifteen roots and meanings per week.
(2) Read up the history of the language to 1600.
(3) *Henry V.*, Act II., Prologue, Scenes 1 and 2.
(4) Prepare thoroughly the Essay on Marriage and Single Life.
(5) The grammar of the Noun.

Notes.—(1) History of the Language. The language in the period for this month's study underwent several very important modifications. The conflict of tongues, Norman-French *v.* Saxon, had by 1250 resulted in English, a compound of both, as we saw last month, but English of the fourteenth and fifteenth centuries was very different from modern English. There existed three distinct dialects, Northern, Midland, and Southern, and even Chaucer admits the difficulty he found in writing so that his Tales might be understood by all. This dialectic difference still remains to some extent. It would be difficult for a rustic from Somerset or Devon to follow easily the talk of a Yorkshire miner. But the introduction of printing fixed the spelling of words if it did not eliminate this difference in pronunciation, and it was possible for all to *read* a common tongue, and hence the language became fixed.

The end of the fifteenth century is famous for the commencement of the Revival of Learning, which will be dealt with fully in the History notes later on, but it affected the language powerfully in two ways: (1.) The spread of Latin and Greek literature in the schools led to the adoption of many classical words, which being taken direct from the languages, are nearer the original in form than those which had gone through Low Latin, French, Norman-French. Hence we get two words from the same root often meaning different things. The Greek *eleemosune*, coming through Latin and Anglo-Saxon, became eventually *alms*, the same word in its adjectival form adopted direct as *eleemosynary; potio* in the Latin came through Norman French as *poison*, taken direct it is *potion;* from the Latin *legalis* we have *legal* and *loyal*, &c. This Latin of the Fourth Period strengthened the language, but it was overdone by the writers of the time, who, despising simple English words, endeavoured to substitute for them cumbrous classical terms, *e.g. muliebrity* for *womanhood*, *itinerated* for *went*. As a rule the simple home word finally held its own, in some cases both words remain, *e.g. boyish* and *puerile*, although we have made a change in the meaning. (2.) The spread of geographical knowledge and enterprise led the English into contact with other European powers, and hence we find many words introduced. Italian words, connected with art, poetry, &c., Dutch words with shipping, Spanish and Portuguese words, &c.

(2) Act I. sets out the causes of the campaign, Act II. gives us the preparations for departure. The Prologue spoken by the Chorus supplies, as it often did in Shakespeare's time, the stage's furniture. Instead of the magnificent and expensive scenery which we should see in a modern production, we are simply told that the scene is changed to Southampton. Where no such intimation is given in the text, the scene was often indicated by a notice-board, "This is a Forest," &c., and the attention of playgoers at that period was certainly not distracted by a bewilderingly beautiful scene. Nym, Bardolph, and Pistol, Falstaff's three ragged followers, supply the lighter side to the play, but it must be confessed that we miss their master, who in *Henry IV.* and *The Merry Wives* affords us such amusement. Drunkard, braggart, and coward as he was, there was something of the gentleman in Sir John, something that in spite of his faults endears him to us, and we cannot read of the death-scene, "I saw him fumble with the sheets and play with flowers—his nose was as sharp as a pen, and a' babbled of green fields," without a feeling of pity. His followers are men of a different stamp, they lack the genuine ring. Their tall talk is manifestly simple boasting, their oaths increase in proportion as their valour diminishes, and they have not the same ease of extricating themselves from an impossible position as had Sir John. Still it strengthens the play to look upon a national contest, not only from the point of view of the Earl and Duke, but also from that of the man in the street who goes forth to seek not honour but cash, and who has no intention of running any unnecessary risks.

(3) The Essay on Marriage must be read as merely the view of the selfish man, who desires to keep everything to himself, and despises those who do not happen to agree with him. The statements from beginning to end are open to sharp criticism. "The best works have proceeded from the unmarried or childless men" (this is absolutely wrong), "Unmarried men are the best friends," "A single life doth well with Churchmen"—these statements would not be endorsed by the majority of mankind.

Bacon was simply regarding marriage as affecting the prospects of an ambitious courtier, such as he was himself, and hence the essay is biassed.

(4) Revise the grammar of the noun carefully. Especially cases: Nominatives of Address, in Apposition, Absolute, Direct and Indirect Objects, Residual Object, Cognate and Factitive Objects, &c. The peculiarities of number must be studied.

8. *Geography.*—(*a*) Finish the Revision of the countries of Europe. Pay special attention to Russia, in view of present events. Especially the government.

The government of Russia is a despotic monarchy, all powers being vested in the Czar, whose proclamations have the force of law. The Czar is aided by a Council of State and a Senate, but there is absolutely no popular representation. The chief power is exercised by the Ministers controlling the ten great departments (Public Works, Finance, Justice, War, Admiralty, etc.).

Each Province has a kind of local administration called the *Zemtsvo*, which meets ordinarily once a year, but which has little power.

The people are divided into distinct classes—(*a*) the nobility, for the most part rich and holders of extensive lands; and (*b*) the peasants, who were only emancipated from serfdom in 1861.

The latter are extremely poor and ignorant, although they are the chief wealth producers of the country. They are heavily taxed, and live under conditions similar to those which obtained in England during the dark ages. Tolstoi says that the peasant never knows what it is to feel satisfied with food from the day he is born till he dies.

The conditions to-day are very similar to those in France before the Revolution. A rich nobility and a down-trodden, ignorant peasantry. The latter appeal for education, reform, opportunity, and a voice in the government; the former, who hold all the chief offices, refuse. The present Czar, nominally a despotic monarch, is really compelled to act as he does by the aristocracy. The social condition of Russia is an anachronism, the institutions of the twelfth and thirteenth centuries existing in the twentieth. The result is obvious. Either the people must be satisfied by sweeping reforms or they will take them by force. At present they are suppressed by the army, but signs are not wanting that the Russian soldier will do as the French did in '89, and side with the people, to whom he belongs in class.

(*b*) The Geography of India: Peoples, Religions, States, Towns, and Government.

This is a most important piece of work. The great Indian Empire, with its 300 million inhabitants, presents the most complex problems to any government. The variety of races, tongues, institutions, customs, and religions is at first bewildering. It is not one country but many, and a law which pleases one part is bound to be obnoxious to another.

The people may be divided roughly into two classes, (*a*) descendants of the original inhabitants, and (*b*) those descended from the conquerors who from time to time swept over Hindustan from the north-east, which embrace the more warlike peoples *e.g.* Pathans, Sikhs, Rohillas, Marathas, etc.

Kipling's *Kim* gives an excellent insight into the domestic life of India.

The religions and sects are as numerous as the peoples. The two chief religions are Mohammedanism and Buddhism in its various debased forms.

The whole country has an area of about 1¾ million square miles, of which rather more a million square miles is under direct English rule—rather less than ¾ million under native rule. The chief native states are—Baroda, Hyderabad, Mysore, Gwalior, Kashmir, Kalat, Oodeypore, Bikaneer, Jeypore, Jodpore. Some states pay tribute, others do not. British law does not apply to them, but to every native court a Resident is attached whose duty it is to advise the native prince, and to secure as liberal and well-organised a government as possible.

British India is divided into 14 Provinces:

Under Governors . . .	Madras and Bombay	2	14
,, Lieutenant-Governors .	Bengal, Agra and Oude, Punjab, Burmah .	4	
,, Chief Commissioners .	Assam, Central Provinces, Ajmere, Merwera, Coorg, Baluchistan, North-West Frontier Province, Andaman Islands, Berar . .	8	

The government is unique.

At home—Secretary of State for India and Council.

In India { *Supreme Government*—Viceroy (Lord Curzon); Commander-in-Chief (Lord Kitchener); 5 other members (together with 16 additional members for making laws called in as required; } 14 Provincial Governments as above, further divided into } 259 districts, each under an executive officer called Collector-Magistrate, or Deputy-Commissioner.

The progress of India since the government was taken from the East India Company has been great. The whole aim has been to improve and not to annex. With this object finances have been carefully nursed, taxes adjusted, justice administered, roads and railways made, harbours strengthened, improved methods of agriculture introduced, industries fostered, trade developed, education given, natural resources carefully husbanded. India to-day is more prosperous than it has ever been or could be under divided rulers, and although it is wretchedly poor it is increasing in wealth.

The fairy tales of early travellers, whose eyes were blinded by the glitter and pomp of ceremony at the native courts, gave rise to the erroneous impression that India was a wealthy country. It is not so—judged by wages it is the poorest on earth. The British occupation has been wholly for good, and the native princes recognise this.

The revenue of the country for 1902 was about £76,000,000, the expenditure £74,000,009. Compare this with the British Isles:—

	Area.	Population.	Income.
	Sq. Miles.		£
British Isles . .	121,377	42,000,000	151,551,976
India . . .	1,767,000	300,000,000	76,000,000

A country between fourteen and fifteen times as large, with seven times as many people, has only half the revenue. Note carefully the imports and exports.

The whole of this section of your work will need the most careful attention.

(Test your reading by seeing if you can answer all the questions in "Test Questions in History," Meiklejohn and Holden.)

9. *History.*—William I. and William II.

The following points must be thoroughly understood.

William I.—(1) Completion of Conquest, which was by no means finished at Hastings, and which was not effectively carried out for five years.

(2) The various attempts made by the English in the North, West, and East, to throw off the yoke. The cause and results of each, and especially why they failed (=lack of concerted action).

(3) The plots by the Normans against William.

(4) The changes produced by the Conquest: Change in Dynasty, change in Law, Church reformed and brought up to date, change in ownership of land, change in dress, food, amusements, &c., improvement in architecture and building generally, Saxons reduced to serfdom, &c.

(5) The Feudal System:

(*a*) Ceremonies. Homage (the act). Fealty (the oath). Investiture (the transfer or putting in possession).

(*b*) Incidents. Aids, escheat, primer seizin, wardship, &c.

(*c*) Differences between English and Continental systems.

(*d*) General effect on the country and people.

(6) Lanfranc and the Church. Clerical courts, founding of cathedrals, &c.

(7) Affairs in Normandy. French Campaign.

(8) The Doomsday Book (compiled as a record in levying taxes). Curfew (a wise precaution). New Forest.

(9) Character, wife and children of the King.

William II.

(*a*) The contest with Robert.

(*b*) The rule at home.

(*c*) Anselm and the Church.

(*d*) The Crusades.

10. *Arithmetic.* The theory of Ratio and Proportion. Work as many exercises in simple and compound proportion as you can.

Ratio is the relation existing between two quantities of the same kind with regard to their magnitude. A ratio consists of two

quantities, the former called the antecedent, the latter the consequent.

If the antecedent is the greater, as 7 : 5, it is a ratio of greater inequality.

If the antecedent is the less, as 5 : 7, it is a ratio of lesser inequality.

In Direct Proportion each quantity increases in the same ratio, *e.g.*, 2 books cost 4s., ∴ 4 cost 8s.

In Inverse Proportion one quantity increases as the other diminishes, *e.g.*, if food last 4 men 2 weeks, it will last 8 men 1 week, &c.

Compound Ratio is found by multiplying the antecedents from a new antecedent and the consequents for a new consequent: *e.g.*, 24 : 60 is a ratio compounded of 2 : 3 ; 3 : 4 ; 4 : 5.

Duplicate Ratio is found by squaring each term, *e.g.*, 9 : 49 is the duplicate of 3 : 7.

Sub-Duplicate Ratio is found by taking the square root of each term, *e.g.*, 5 : 7 is the subduplicate of 25 : 49.

N.B. Each term of a ratio may be multiplied or divided by the same number without altering the value of the ratio, *e.g.*, 12 : 8 = 24 : 16 = 36 : 24 = 3 : 2 = 6 : 4.

Proportion is the equality of two ratios, for example, 3 books : 4 books : : 4s. 6d. : 6s.

In any proportion the product of the means equals the product of the extremes, hence if any one term is missing it may be found.

In the ratio $a : b :: c : d$. $ad = bc$.

Therefore, $a = \frac{b \times c}{d}$, $b = \frac{a \times d}{c}$, $c = \frac{a \times d}{b}$, $d = \frac{b \times c}{a}$.

Also $\frac{a}{b} = \frac{c}{d}$ or $\frac{b}{a} = \frac{d}{c}$ &c. Find as many equalities as you can from this general statement and prove each by reference to numbers.

In working exercises in proportion you should be familiar with the proportional method based on the above and the method of unity. The latter is preferable to teach to children.

11. *Algebra.*—G.C.M. and L.C.M. by Factors. Learn carefully the proof of the rules for finding the G.C.M. and L.C.M.

The rule for the G.C.M. is based on the law that, if one quantity measures two other quantities it measures the sum or difference of any multiples of each.

If A measure B and C it measures $mB \pm nC$
for if A measures B let $B = pA$
A ,, C ,, $C = qA$
Then $mB \pm nC = mpA \pm nqA = A\,(mp \pm nq)$.

Take an exercise worked in the usual way. Find the G.C.M. of A and B.

A) B (p
pA
C) A (q
qC
D) C (r
rD

D is the G.C.M. of A and B.

(1) To prove it is a measure. D measures $rD = C$ ∴ it measures $qC + D = A$ ∴ it measures $pA + C = B$.

(2) It is the greatest measure. Suppose there is a greater common measure x. Then x measures A and B ∴ it measures pA ∴ it measures C, $(B - pA)$ ∴ it measures qC, and D, $(A - qc)$.

Now no measure of D can be greater than itself ∴ D is the greatest common measure.

Can any student point out what is wrong evidently with these sums.

(1)
$$x^2 - x^2 = x^2 - x^2$$
$$\therefore (x - x)(x + x) = x(x - x)$$
$$\therefore x + x = x$$
$$\therefore 2 = 1$$

(2)
$$16 - 36 = 25 - 45. \quad \text{Add } \tfrac{81}{4} \text{ to each}$$
$$16 - 36 + \tfrac{81}{4} = 25 - 45 + \tfrac{81}{4}$$
$$\left(\frac{4}{2} - \frac{9}{2}\right)^2 = \left(5 - \frac{9}{2}\right)^2$$
$$4 - \frac{9}{2} = 5 - \frac{9}{2}$$
$$\underline{4 = 5}$$

I shall be pleased to send a copy of "Test Questions in History or Geography" to the first four students that explain the errors properly.

Women.—Addition and Subtraction. Work the exercises in Chapter II. (*Scholarship Mathematics for Women*, W. B. Clive).

12. *Euclid*, Book I., Propositions 12–16, with 4 deductions each week. Prove the following :—

(1) Any point D is taken within an equilateral triangle ABC, and on AD and the same side of it as B in equilateral triangle ADE is described. Prove BE = CD.

(2) ABDE, BFGC are squares on two sides of a triangle ABC and AF, CD are joined. Show that AF = CD.

(3) In the triangle ABC right angled at A, BC is double of AB; show that the angle B is double of the angle C.

(4) Describe an isosceles triangle, having given the base and the length of the perpendicular drawn from the vertex to the base.

Women.—Learn Propositions 3, 4, and 5.

13. *Science.* — Energy — Heat, radiation, electricity, and chemical action as forms of energy.

Mechanical work.

Heat and temperature, effects of heat, thermometers.

14. Learn 100 words per week from "Words Commonly Misspelt."

Test Questions.

English.—1. Point out the chief effects of the Norman Conquest on the speech of the country.

2. Give several examples of words in which the following syllables are contained, and show in regard to each group what is the common element of meaning and from which language the word is derived—*phil, rect, dom, tele, sent, tract.*

3. Explain the following—"Whipped the offending Adam out of him," "hydra-headed," "crescive in his faculty," "In terram Salicam mulieres ne succedant," "King Pepin which deposed Childeric," "a nimble galliard."

4. Write a paraphrase of Act I. Scene ii. :—

"For so work the honey bees
. . . be all well borne without defeat."

5. Analyse the following and parse words in italics :—

"My friend came *to see* me this morning and asked if I *could* accompany him on his *next* journey, but I told him I could not *do so as* I was *too* busy."

Geography.—1. Describe a coasting voyage from Christiania to Hammerfest.

2. Give some account of the colonial possessions of Denmark, and the character of their trade.

3. Holland is said to be "the spice merchant of Europe," and Belgium "one great town." Explain and justify these statements.

4. Describe the monsoons and their effects upon India.

5. What productions of India have been largely increased during recent years, and why?

History.—1. Justify Alfred's claim to the title of Great.

2. Give some account of the policy and aims of Dunstan. To what extent were they successful?

3. What events before the Conquest tended to bring it about?

4. Write an essay on the home life and institutions of the Saxons.

Arithmetic.—Work the following :—

1. A bicycle travels 18 miles per hour. If the circumference of the larger wheel be 15 ft. 9 in., how many revolutions does it make in 42 minutes? Ans. 4224.

2. If $1\frac{1}{17}$ of $\frac{3}{8}$ of $2\frac{1}{2}$ of 40 lbs. of alum cost $1\frac{1}{20}$d., how many lbs. can be bought for 6s. $7\frac{1}{2}$d.? Ans. $26\frac{1}{11}$.

3. Express the difference between $2{\cdot}53\dot{5}$ and $2{\cdot}535$ (*a*) by a circulating decimal, and (*b*) by its equivalent vulgar fraction; and simplify $1{\cdot}44$ of $\frac{{\cdot}0032}{7{\cdot}2}$ without converting the remainder into vulgar fractions. Ans. $\cdot 000\dot{5}3\dot{5}$, $\frac{1}{19\,99\,90}$, $\cdot 00064$.

4. Find the value of $\dfrac{1\frac{1}{2} \div 1\frac{1}{4}}{\frac{3}{8} \text{ of } \frac{5}{6} \div 10\frac{1}{2}} \times \dfrac{1\frac{1}{2} \text{ of } 4\frac{1}{2}}{6\frac{1}{4} \text{ of } 5\frac{1}{4}}$ of £1.
Ans. £4, 7s. $2\frac{1}{2}$d.

5. Add $9{\cdot}94\dot{6}$, $\cdot 0\dot{3}\dot{4}$, $12{\cdot}\dot{3}$ without reducing to equivalent vulgar fractions; and reduce $\frac{1}{11}\frac{1}{13}$ to a recurring decimal.
Ans. $22{\cdot}3146237\dot{3}$; $\cdot 20\dot{1}3\dot{2}$.

Science.—1. Explain the three systems of pulleys. Which gives the greatest mechanical advantage, and which is most commonly used?

2. What common appliances are based upon the principle of the screw? Explain fully.

Algebra.—Resolve into factors :—

$(a+b)^2 - (c-d)^2$ Ans. $(a+b+c-d)(a+b-c+d)$.

$x^4 + 2x^2y^2 + 9y^4$. Ans. $(x^2 + 3y^2 + 2xy)(x^2 + 3y^2 - 2xy)$.

$x^4 - 2x^2 - y^2 - z^2 + 2yz + 1$. Ans. $(x^2 - 1 + y - z)(x^2 - 1 - y + z)$.

$48c^4d^2 - 243d^6$. Ans. $3d^2(4c^2 + 9d^2)(2c + 3d)(2c - 3d)$.

$x^4 - n^2 - 4m^2 + 9y^2 - 4mn - 6xy$.
Ans. $(x - 3y + 2m + n)(x - 3y - 2m - n)$.

$a^4 + a^2 + 1$. Ans. $(a^2 + a + 1)(a^2 - a + 1)$.

PUPIL TEACHERS' COURSE

For Entrance Examination, 1905.

Work to be Prepared.

1. *Reading and Repetition.*—Steady and earnest practice must be taken in these subjects.

2. *Penmanship.*—Write a page daily in the *Practical Teacher Copybook*, and use great care at all times.

3. *English.*—(1) *Lay of the Last Minstrel*, canto iv., stanzas 13 to the end. Be prepared to paraphrase and analyse any part, and to parse any word. Learn the meanings of all allusions and the notes.

(2) Learn ten roots and meanings per week.

(3) Revise the grammar of the noun, pronoun, and adjective.

(4) Write an essay each week on such subjects as:—

(*a*) Holidays and their uses.
(*b*) Description of your native town.
(*c*) A rolling stone gathers no moss.
(*d*) Spring-time.
(*e*) Birds.

Great care must be taken with the essay. Arrange your ideas on a definite plan, work out a skeleton essay, and then express your ideas in clear and simple language, avoiding a too childish style on the one hand and an artificial inflated style on the other.

In dealing with any subject such as (*c*), it is well to point out that it is a proverb—"the wisdom of many and the wit of one." Explain it in its literal sense, and then in the figurative sense. In such an essay you are not expected to agree entirely with the quotation; you may discuss it, and take the opposite view if you like.

4. *Geography.*—Asia. Physical features, climate, and productions.

Draw a large sketch-map, insert the names of all places to be remembered, and practise till thoroughly known. Note the similarity of the south to the south of Europe. Trace the radiating lines of mountains from the Hindu Kush. Get a clear idea of the build of the country. It will help you to model it in clay. The climate depends upon latitude, altitude, and slope. Why is Siberia colder than the corresponding parts of Europe? Note the monsoons—their causes and effects. If the general work is well done, the subsequent preparation of the individual countries will be comparatively easy.

5. *History.*—Henry the Eighth and Edward the Sixth.

This is another very important period, the early part connected with Wolsey and his policy, the later with the Reformation. Read a life of Wolsey and understand his aims. During the first five years Henry was one of the Holy League formed to protect the pope, and to drive the French out of Italy. The battle of Flodden resulted from this, the Scotch taking the part of France. The rivalry of France and Spain led each of them to court the support of England, and gave Henry the part of arbitrator. The passion of the king for Anne Boleyn led him to desire a divorce from Catherine of Arragon, and this caused (*a*) the downfall of Wolsey, for if he supported the king he lost all chance of becoming pope, and if he opposed him, he lost all power at home; and (*b*) the severance of the English Church from that of Rome.

The Reformation was a great religious revival, the object, as the name implies, being to reform the Church. The claims to papal infallibility, the sale of indulgences, the corrupt lives of the clergy, led men to protest strongly. The earlier reformers were either cowed to silence or put to death, but Luther headed a movement in Germany which threw the whole of Western Europe into a ferment.

The reformers refused to believe in (1) Transubstantiation; (2) Communion of one kind; (3) Celibacy of the clergy; (4) Efficacy of masses for the dead; (5) Auricular confession, &c.

Henry was *not* a reformer. Although he separated from the Church of Rome, he upheld all its doctrines (see Statute of Six Articles), and burnt both loyal churchmen and Protestants in the same fires. But unconsciously he helped forward the Reformation in England, especially by the suppression of the monasteries. This action had serious results for England. The monks, with all their faults, were good to the poor. The new landowners turned the land into sheep farms, threw men out of work, and did nothing to alleviate distress—hence the Pilgrimage of Grace, and Ket's Rebellion.

The reign of Edward the Sixth was favourable to the Reformation. Note the contest between Somerset and Northumberland.

Prepare lives of the chief men—Wolsey, Cranmer, More, Somerset, &c.

6. *Arithmetic.*—Discount, and stocks and shares.

There is little difficulty in these sums if the theory is thoroughly understood.

7. *Algebra.*—Division. Work as many examples as possible.

8. *Science.*—Examination of common metals and common household substances, such as salt, starch, sugar, soda, soap, as to appearance, solubility, behaviour on heating, &c.

Change in weight when substances are heated, and the examination of their products.

Study of air. Composition, effects on iron, phosphorus, &c.

Test Questions.

The following are the questions set last year. Should any candidate desire, the answers will be marked and criticised, if sent direct to Mr. A. T. Flux, Oakleigh, Belvedere, with a shilling postal order.

Arithmetic.—1 hour. Answer three questions.

1. If, when a number is divided successively by 6, 5, and 7, the remainders are 2, 4, and 3 respectively, and the quotient 9, what would be the remainder if the number were divided by 210? What was the original number?

2. Add together $\frac{7}{15}$ of 2 tons, $\frac{2}{3}$ of 1 ton 15 cwts., $\frac{1}{8}$ of 1 cwt. 2 qrs. 21 lbs., $\frac{3}{4}$ of 1 qr. 17 lbs., and express the result as the decimal of 10 tons.

3. On what day will the Simple Interest on £40, 11s. 1½d., lent on April 3rd, amount to 11 shillings at 7½ per cent. per annum?

4. A buys eggs at 5 for 6d., and sells them at 2 for 3d. B buys at 45 for 2s. 6d., and sells them at 10 for 8d. By how much per cent. is A's investment of his capital more profitable than B's?

5. A metre being 39·371 inches, and a franc 9·38 pence, what is the value in English money of a yard of silk worth 7·5 francs a metre? Give the answer correct to $\frac{1}{10}$ of a penny.

Geography.—¾ hour. Answer three questions.

1. Describe a sea voyage from Riga to Marseilles. Mention and describe three or four places of interest which would be passed

2. What are the principal industries at St. Etienne, Rouen, Lille, Rheims, Munich, Dresden, Leipzig, Nuremberg?

3. Name the rivers of India which seem to you to be the most important. Contrast and describe their river basins.

4. What are the chief exports of France, Germany, and India to this country? What do we send them in return?

5. What do you know of Peshawur, Port Arthur, Belgrade, Chemulpo, Chitral, Tokio, Bushire?

History.—¾ hour. Answer three questions.

1. Give a brief account of the life and government of William the First.

2. On what grounds are (1) Stephen Langton, (2) Simon de Montfort, (3) Edward the First regarded as amongst the greatest of English statesmen?

3. What is meant by the Hundred Years' War? Describe briefly that part of it which occurred in the reign of Edward the Third.

4. What do you think of the rule of Henry the Eighth? What can be said for and against his government?

5. Write down all you can about three of the following:—Feudalism, Lords Ordainers, Lollardry, Canterbury Tales, Cade's Revolt, Pilgrimage of Grace.

(*Other Papers will be given next month.*)

OUR CERTIFICATE COURSE FOR 1905.

BY GEORGE COLLAR, B.A., B.SC.,
Head-master of the Stockwell Pupil-Teacher School.

TEST QUESTIONS ON LAST MONTH'S WORK.

THEORY OF TEACHING.

1. Show that by the method of "complementary addition" it is possible to teach addition and subtraction concurrently. What other advantages does this method offer?

2. Give some of the chief rules that should be observed in planning school buildings.

3. How many children should work in a room 30 feet long, 20 feet broad, and 13 feet high? Sketch a plan of such a room, and show the arrangements for lighting and ventilating it.

English Language and Literature.

1. Write a short life of Edmund Burke.
2. Give an outline of the circumstances and the argument of *Thoughts on the Present Discontents*.

English History.

1. Trace in outline the rise of Russia and of Prussia.
2. Give an account of the War of the Spanish Succession. What were the results as far as England was concerned?
3. Write an account of Robert Walpole's career as a statesman.

Geography.

1. Describe the lakes of Africa.
2. Give an account of the Nile, and a short history of the exploration of its upper parts.

Arithmetic.

1. What do you mean by "percentages"? Say what are the most common sources of error in working problems on percentages.
2. A shopkeeper marks his goods with a price from which he can deduct 7½ per cent. for prompt payment, and still make a profit of 10 per cent. on what the goods cost him. Find the cost price of an article which he marks at £2, 15s.
3. A man buys 45 bushels of apples at 2s. 6d. a bushel; a third of them are spoilt; of the remainder he sells one third at 2d. a pound, and two-thirds at 4s. a bushel; a bushel of apples weighs 40 lbs. What profit does he make, and what is his profit per cent. of his outlay?

Geometry.

1. Show that if a straight line drawn through an angle of a triangle cut the opposite side, or that side produced so that the ratio of the segments of that side is equal to the ratio of the other sides of the triangle, the straight line bisects the vertical angle internally or externally.
2. If ABC be a triangle, and F and E points in AB, AC respectively, such that EF is parallel to BC; then if BE and CF intersect in G, show that the triangles AGB and AGC are equal.

Algebra.

1. Find the Greatest Common Measure of

$$2x^4 - 3x^3 + 4x^2 - 9x - 6 \text{ and } 4x^3 - 9x^2 + 12x - 27,$$

and write down these expressions in factors.

2. Show that the following expression is the product of three factors:—

$$3a(2a^2 + b^2) + 9a^2b + b(a + b)(2a + b).$$

3. A certain number, consisting of two digits, exceeds four times the sum of its digits by 3; if the number be increased by 18, the result is the same as if the number formed by reversing the digits were diminished by 18; what is the number?

Elementary Science.

1. Describe in detail the germination of a bean.
2. What chemical substances are found in a seed, such as a bean or a grain of barley, and what changes do they undergo when germination takes place?

NOTES AND SYLLABUS FOR MARCH.

English Composition.

Study carefully the third section of chapter x. of Nesfield's *Senior Composition*, and reproduce some of the descriptive essays. Those working from Meiklejohn's *Art of Writing English* should study chapters xvi. and xvii. Note the figures of speech in any prose book you read, and endeavour to find out what has been gained by the use of figurative language in place of that which is literally correct. In your own writing work in a few figures of speech, but do it with caution; avoid the dangers that are pointed out, and above all do not use figurative expressions if they give an artificial air to the composition.

Prepare essays on the following subjects:—

1. Politeness.
2. Public opinion.
3. Examinations.
4. Historical novels.

Theory of Teaching.

Finish the chapter on teaching Arithmetic.

We now come to consider the important subject of lighting the school and class-room, and we notice that the two chief considerations are the amount of light and the direction from which it comes. In several countries of Europe the ratio of window surface to floor surface in schoolrooms is settled by law, and the minimum is fixed at 1 to 6 when the building stands quite alone, and 1 to 4 when the light is obstructed by neighbouring buildings. In Prussia the minimum sanctioned is 1 to 5, and most people agree that this is the lowest ratio that should be allowed anywhere. As to the maximum, Dr. Cohn and other authorities say that there cannot be too much light in a schoolroom. In Germany, too, a standard of brightness is fixed for the dullest part of the room, which should be the same as that given by a 10-candle light at one metre distance. The window arrangements should be such that every pupil can see some portion of the sky, and be able to read small print (Diamond type) at a distance of a foot. No pupil should be seated more than 20 feet from a well-lighted window.

Authorities are not quite agreed as to the direction in which the light should enter the room; some urge that direct sunlight should never enter the room, and others advocate the use of windows towards the south. Perhaps it is best to allow direct sunlight to come into the room for a small portion of the morning or the afternoon. All are agreed that the pupils should never be seated so as to face the window, and also that it is objectionable to have light admitted from both the left and right. If the light comes from the right the pupil turns towards it when writing, and he has to write in the shadow of his right hand. The best arrangement is to have the windows on the pupil's left, and these may be supplemented by windows up behind, provided that the latter admit less light than the former. The windows should consist of large panes, and reach well up to the top of the wall. Venetian blinds and dark curtains are both objectionable, as they obstruct such a large amount of light. A brown holland blind is about the most suitable one that can be obtained, and because the light from the upper part of the window is the most effective, the blind should rise from the bottom, not come down from the top.

It is very desirable that the light should be diffused. If children write in direct sunlight, their eyes are tried by the sharpness of the shadows cast. The windows may therefore be glazed, particularly in the upper part, with ribbed or prismatic glass. It is claimed that on bright days such windows admit 50 per cent. more of effective light, and if the day be dull, the effective light is more abundant still than when ordinary glass is used. Diffusion of light is also brought about by having the walls distempered a light grey, cream, or green colour. A pale green does not perhaps reflect the light so effectually, but it is more restful to the eye than the other tints. The lower part of the wall is not of so much use in this respect, so a dark dado should be used, which will not so readily show marks of dirt.

The sanitary arrangements form a very important item in a block of school buildings. Wherever possible, earth closets should be employed; they are the safest, most economical, and simplest of all the arrangements adopted. Unfortunately, the labour of removing the soil and supplying the fresh earth precludes their use in town, and recourse is had to water-borne sewage systems. The automatic syphon flushing-tank system is about the best of the water systems; but, whatever system is adopted, it requires the constant care of the schoolkeeper, and the head master must exercise due supervision to make sure that the work is carried out regularly.

In a few English schools baths are to be found. In some German and American towns the bath is as much a part of the school curriculum as geography or drill. The head master of one of the schools in Boston says: "Since the baths have been opened, an average of 175 pupils have had a bath every school day. This gives every pupil in the school over eight years of age an opportunity to bathe once a week. Ninety-five per cent. improve the privilege. The baths are in charge of a matron;

each class is assigned a time to bathe, as they would for a recitation.*

"The scheme works smoothly and beautifully, and is a blessing to the children physically, mentally, and morally, and a blessing to the teachers, too. I am inclined to think that, if a child bathes once a week from eight to fourteen years of age, he will always seek to be clean and wholesome. . . . I think and trust that the time is at hand when all of our schools will be equipped not only with shower-baths, but with swimming pools. As educational agents they cannot be surpassed."

In Germany, we read, "the pupils bathe by classes, the bathing is carefully supervised, pupils come in divisions like soldiers, and follow each other every five minutes, and thus a large number of pupils bathe in a very short time."

English Language and Literature.

We must now go through the *Thoughts*, analyse the paragraphs, and comment on the words and phrases used.

1. The difficulty of dealing with political questions, and the ways in which the critic is open to blame. The necessity for rulers to take into account public opinion.

2. Some failings are common to all ages, others are peculiar to this.

General infirmity, the infirmity common to the whole *genus* or race in all time, as opposed to the "particular distemperament."

Symptoms, from a Greek word meaning "falling with," hence applied to a sign which always "happens with" a particular illness, and is regarded as a characteristic of it.

3. It is universally admitted that political conditions are much deranged.

Notice the long series of noun clauses all in apposition with the demonstrative pronoun "these," and forming the subject of the last clause—"are facts."

4. The national discontents cannot be regarded as the result of any great national disaster, as pestilence, famine, or unsuccessful war.

5. The explanation given by the Government is that a period of great national prosperity has made the people "proud, ferocious, and ungovernable."

6. The reasons alleged by the Government are not intended to be taken seriously, since no one would think of trying to cure the ill by removing the alleged causes—national wealth, colonial possessions, and political freedom.

7. *Les révolutions*, etc. "Revolutions which happen in great states are not the result of chance or of the caprice of the people. Nothing upsets the great people of a kingdom like a weak and disordered government. As for the populace, it is never from a desire to attack that the people rises, but from impatience of suffering."

8. It does not follow that we have no grievances because our troubles are not those that the country suffered under the Tudors and Stuarts.

Cause, a case to be tried in a law court.

9. It is much more easy to pass a judgment upon past times than upon our own.

10. We have an instance of this in our own time, when Protection, which is discredited, is reintroduced under the names of "Fiscal Reform" and "Colonial Preference."

11. The same attempts are not made against a fully developed constitution as against a new one.

12. Neither the Court nor the House of Commons, though for different reasons, wish to curtail the power of the latter.

Usufruct, the use and profit of that which is the property of another.

Fee, the actual ownership.

13. The Prerogative of the Crown, being based upon "antiquated prejudices" of the people, could not be a permanent force, but the "Influence" which conciliated and employed those who might otherwise have been active opponents of the Crown is stronger and less odious.

14. The Court felt an objection to government by powerful Ministers because their power reverted to the people.

Mortmain, literally "dead hand"; property in the possession of a Church or Corporation from which it could never be recovered.

15. The plan was therefore tried by the friends of Frederick, Prince of Wales, for getting that power by the *influence* of the Court which could not be claimed as a *prerogative*.

16. The "person, in rank indeed respectable, and very ample in fortune; but who, to the moment of this vast and sudden elevation, was little known or considered in the kingdom," could not have been Bolingbroke, who returned to England in 1737 to support Prince Frederick, but was probably Pulteney. The remark, however, is of general application.

17. The first step was to arrange that the Court should have all the influence and the Ministers all the responsibility.

18. The second was to secure that the lower Ministers should side with the Court against their chiefs.

Emoluments, payments; *ostensible*, apparent, that which is seen.

19. Parliament was, lastly, to be brought to acquiesce in the arrangement.

20. With every one looking to the Court for advancement, the influence of the latter would be supreme.

21. Although it may be a matter of surprise that such a policy could ever be adopted, yet the facts are such as to command our serious attention to the scheme.

Unplausible, unlikely; probable; literally, not worthy of approbation.

22. The favourable circumstances under which George III came to the throne. His influence was increased because he had the power to appoint those who pleased him to lucrative posts which came into existence in his reign "by additions from conquest, by augmentation of debt, by an increase of military and naval establishment." So he could appoint men to colonial governorships and offices in the army and navy to a greater extent than his predecessors had done.

23. His Majesty sought to preserve the spirit of national freedom, but the Court faction saw in these conditions an opportunity of aggrandisement.

24. The student must refer to the History text-book (Gardiner, chapter 47) to see how Pitt's influence was undermined, and how the Court party sought to take away all appointments for which the holders did not feel indebted to them.

25. Thus were pulled down all who owed their power to popularity and all who owed it to family and party connections.

26. In order to justify their action the Court party issued a pamphlet declaring their desire to suppress all corrupt influence in the government.

27. This pamphlet set out the idea of separating the Court from the Administration.

28. It declared that the evils of party politics and jobbery could be avoided only by making the King the sole patron. It supposed the King to be a very model of discernment and of integrity.

Atë, the goddess of vengeance and mischief; she was driven from heaven but settled among men—

> "With Atë at his side come hot from hell . . .
> Cry 'havoc,' and let slip the dogs of war."
> —*Julius Cæsar*, iii. 1.

Republic of Plato. Plato, the Greek philosopher, wrote a dialogue called the *Republic*, in which he described an ideal state.

Talking prose. The reference is to M. Jourdain in Molière's *Bourgeois Gentilhomme*, who is intensely pleased on learning the fact that he has been talking prose all his life without knowing it.

Mettre le Roi hors de page, a French phrase meaning to make the king his own master.

29. An essential part of the plan was to prevent the Ministers from combining so as to offer a united opposition to the Court.

What good consequences followed, an instance of Burke's irony.

So much deplored, i.e., by this pamphlet.

30. This is a very fine paragraph; it is not, however, intended to attribute the merit to George II. personally, but to the system of government which existed in his reign.

Emulous in affection, rivalling one another in the affection we show.

31. If a prince has to sacrifice his personal interest for the good of the people he should do it readily, and we must be sure that even in that case there is sufficient cause before we introduce a political change.

32. A free people should jealously watch the introduction of any new course of action on the part of either King, Lords, or Commons; but it does not follow that the actions of the Lords are always aristocratic, *i.e.*, in favour of the nobility, any more than it follows that the Commons always adopt a democratic course. Read the relations between Wilkes and Parliament to which reference is made in this chapter.

33. The Peers naturally have a great influence in public concerns, as a body, on account of their property, and in some individual cases "by their uniform, upright, constitutional conduct, by their public and their private virtues," and the

* In American schools a "lesson" is called a "recitation."

public does not regard such greatness as the despotism of the aristocracy.

34. Burke is no friend of the aristocracy, and would rather see England fall under a despotic monarch than under an aristocracy; but there is no likelihood of that happening, and those who complain of the power of the nobility have not a word to say against the influence of those who side with the Court.

35. *An aristocracy*, here used in its literal sense, "government by the nobility." The common meaning—those of noble family—is not the correct one.

36. The writer has examined this cause at length because it is a way in which an attempt has been made to disunite the people.

English History.

Study the reign of George III.

It is important to make full notes of those events and statesmen that are referred to in the *Thoughts on the Present Discontents.*

One of the matters round which much importance centres is the War of American Independence. The student is apt to attach undue importance to minor matters in this quarrel—to prepare detailed accounts of the Battle of Bunker's Hill or of the destruction of the tea at Boston. The chief causes of the war were: 1st, the *Navigation Laws*, which compelled the colonists to trade with England and forbade direct commerce with any other country; 2nd, the *Hinterland Monopoly* (the colonies were situated round the coast, but the inhabitants regarded the tracts of land in the interior as being under their direct influence; they were therefore greatly annoyed by a royal proclamation which announced that the hinterland was English Crown property); 3rd, the establishment of manufactures was forbidden; 4th, came the Stamp Act and the scheme of import duties.

The key to the war itself rests on the two factors—the battle of Saratoga and the loss of sea-power. The campaign that ended disastrously at Saratoga was skilfully planned. Burgoyne was to proceed from Canada and join forces with Clinton, who was ascending the valley of the Hudson. Had this manœuvre been successfully carried out the disaffected provinces would have been isolated and the insurrection no doubt crushed. But, owing to the defeat of Burgoyne at Saratoga, it failed, and the whole course of the war was altered. The student should read the account given in Creasy's *Fifteen Decisive Battles of the World.* The writer there shows the importance of this battle in deciding the war. The other immediate cause was the temporary loss of the supremacy over the sea by the victory of de Grasse over Rodney in the West Indies. On account of this we were unable to prevent the French reinforcements going to America, and were unable to succour Lord Cornwallis. When the supremacy was regained it was too late, for Cornwallis had been obliged to surrender at Yorktown, and the war was practically over.

The whole question of the French Revolution should be read up in a book devoted to that subject alone. The following are recommended: Rose's *History of the French Revolution*, Seeley's *History of Napoleon the First*, Mahan's *Influence of Sea-Power on the French Revolution*, Creasy's "Waterloo" (in *Fifteen Decisive Battles*).

Geography.

Finish the geography of Africa.

Arithmetic.*

Work examples in Averages, Percentages, and Interest.

Many sums in averages are very easily worked if the student will only apply the principle of proportion. The average price of a quantity of goods consisting of two kinds is not the arithmetic mean between the two unless the two quantities are equal. If we mix a quantity of eighteen-penny tea with an *equal* quantity of two-shilling tea, the average price of the whole is 1s. 9d. a pound. But if we put more of the eighteen-penny tea into the mixture it is evident that the average price of the tea will be less than 1s. 9d. a pound. A careful examination of this case shows that *the quantities of the two kinds taken are inversely proportional to the differences between the respective prices and the average price.*

By means of this rule we can work inverse problems without difficulty.

Example 1.—How many pounds of tea at 2s. a pound must be mixed with 6 lbs. at 1s. 6d. in order that the mixture may be worth 1s. 10d. a pound?

The differences between the prices and the average price are respectively 2d. and 4d., therefore the quantities will be in the ratio 4 : 2, hence if we take 6 lbs. of the cheaper tea we must take 12 lbs. of the dearer. We see that this is true, for we gain 4d. × 6 by selling 6 lbs. at 4d. a lb. over cost price, and if we lose the same amount by selling the dearer tea at 2d. a pound under cost we must take $\frac{6 \times 4}{2}$ lbs. of it.

Example 2.—How many gallons of water must be mixed with 30 gallons of milk that cost 11d. a gallon in order that 20 per cent. profit may be made by selling it at 3d. a quart.

The selling price, 1s. a gallon, being 20 per cent. over cost price, *i.e.* 120 per cent. of the cost price, it follows that the mixture cost $\frac{100}{120}$ of 1s. a gallon = 10d. a gallon.

This average price is 1d. a gallon below the cost of the milk, and 10d. a gallon above that of the water (which is supposed to cost nothing), hence the quantities of milk and water are as 10 : 1, and as there were 30 gallons of milk there were 3 gallons of water. Ans., 3 gallons.

Geometry.

Revise back work, do plenty of deductions, and send up difficulties, enclosing stamped directed envelope for return.

Algebra.

Study the chapter on Simultaneous Quadratics. Notice the different ways in which such equations may be solved.

1. If one of the equations is of the first degree, find the value of one of the unknowns in terms of the other from this equation of the first degree and substitute in the other. For example—

$$\begin{cases} x^2 - y^2 = xy. \\ \frac{1}{x} + \frac{1}{y} = \frac{1}{2}. \end{cases}$$

In the second equation $\frac{1}{x} = \frac{1}{2} - \frac{1}{y} = \frac{y-2}{2y}$

$$\therefore x = \frac{2y}{y-2}.$$

Substituting this value in the first equation,

$$\left(\frac{2y}{y-2}\right)^2 - y^2 = \frac{2y^2}{y-2}$$

or $$\frac{4y^2}{y^2-4y+4} - y^2 = \frac{2y^2}{y-2}$$

dividing by y^2; then $$\frac{4}{(y-2)^2} - 1 = \frac{2}{y-2}$$

$$\therefore 4 - (y-2)^2 = 2(y-2)$$

$$(y-2)^2 + 2(y-2) - 4 = 0$$

$$y^2 - 4y + 4 + 2y - 4 - 4 = 0$$

$$y^2 - 2y - 4 = 0$$

$$\therefore y = \frac{2 \pm \sqrt{4+16}}{2} = \frac{2 \pm 4\sqrt{5}}{2} = 1 \pm 2\sqrt{5}.$$

Substituting in the value of x, we obtain

$$x = \frac{2 \pm 4\sqrt{5}}{1 \pm 2\sqrt{5} - 2} = \frac{2 \pm 4\sqrt{5}}{-1 \pm 2\sqrt{5}}.$$

If both the equations are homogeneous of the second degree, then it is best to use m, or some other symbol, to denote the ratio between x and y. When this ratio has been determined, there is really only one unknown to find.

Elementary Science.

Study the influence of light and colour on plant life, also the relations of plants to their surroundings, and particularly the relations of flowers to the insects by which they are fertilised. The arrangements adopted to ensure cross-fertilisation are of such wonderful interest that they will well repay careful study.

OUR SCIENCE SECTION

☞ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this number.**

CHEMISTRY.

(ADVANCED AND HONOURS.)

BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

Melting Points of Sugar Mixtures.—Henri Gillot has constructed a series of curves showing the relationship between melting point and percentage composition for a number of mixtures containing mannitol, dulcitol, dextrose, sucrose, and lactose in pairs. The results show that the melting point of a mixture of any two of these substances is never exactly the mean of the melting points of the two constituents, and that the addition of minute quantities of one sugar to another lowers the melting point of the latter even when the substance added is of higher melting point.

The forms of the curves obtained show that, in all the mixtures examined, with the exception of the sucrose-lactose and sucrose-dulcitol pairs, definite compounds are formed between the two constituents. The sucrose-dulcitol curve shows three branches which may be due to the formation of isomorphous mixtures.

Changes of Density caused by Passage through Drawplates.—It is impossible to give a definite value for the density of a metal; any value, however carefully determined, refers solely to the particular specimen employed. Georg W. A. Kahlbaum has determined the density of platinum wire before and after drawing through drawplates of diameters 0·7 mm. and 0·4 mm. The wire was at first 1 mm. in diameter. After its density had been determined, it was raised to a white heat for three minutes, allowed to cool, and the density again determined. It was then cold-drawn and the operations repeated. The six values so obtained for the density were, (1) 21·4136, (2) 21·4314, (3) 21·4181, (4) 21.4314, (5) 21·4142, (6) 21·4308. Two other specimens which at first had densities 21·4226 and 21·4233 ultimately gave values 21·4310 and 21·4317. These results show that, as indicated by previous observations, great compression produces a diminution of density, whilst heating then produces an increase of density; the values after this treatment seem to tend to a constant value. The experiments are being continued.

Transport Number of Sulphuric Acid.—Olin. F. Tower has determined the transport number of sulphuric acid, using a plate of cadmium as the anode and a platinum spiral as the cathode. The electrolysis was continued for two or three hours at a constant temperature, and the quantity of electricity was determined by means of a silver voltameter. The liquid was divided into five portions, one at the anode, one at the cathode, and three in the middle.

The first portion was analysed by precipitating the sulphuric acid as barium sulphate, whilst the other four portions were titrated with potassium hydroxide solution. The experiments were made with N, N/2, N/5, N/10, N/20, and N/50 sulphuric acid at a temperature, in most cases, of 20°, but in some cases of 8° or 32°. The results are tabulated.

The accuracy of the determinations seems to increase as the concentration decreases to N/20, and then becomes less owing to disturbances caused by the manipulation of the solution and the flow of the current. The results obtained at a temperature of 20° show that the transport number first decreases with the concentration, and then increases especially between N/10 and N/20. No such increase is observed between the same concentrations at 8° and 32°, although an increase appears in these cases at N/50.

The transport numbers found at the different temperatures with the three most dilute solutions are sufficiently constant to indicate either that no HSO_4 ions exist beyond the N/10 concentration, or that some compensation takes place in the dissociation of ions possibly even more complex than HSO_4. The average value of the results gives 178·8 as the transport number of sulphuric acid in dilute solution at 20°. The temperature coefficient was found to be 1·1.

These results are compared with those of previous investigators, and agree best with those of Bein.

The values obtained by Jones and Douglas for the equivalent conductivity of dissociated sulphuric acid are probably much too low. It is shown that the migration number of the HSO_4 ion at 18° is 70, the value which has been adopted by Kohlrausch. Combining this with the transport number of sulphuric acid, the equivalent conductivity of sulphuric acid at 18° is found to be 396, and the migration number of the H ion, 326 at the same temperature. Noyes and Sammet obtained the value 330 for the latter quantity from transference experiments with hydrochloric acid.

Preparation of Persulphates.—Erich Müller states that the addition of hydrofluoric acid to a solution of potassium hydrogen sulphate very materially increases the yield of potassium persulphate which is obtainable by electrolysis. The yield, calculated from the quantities of oxygen and hydrogen evolved during the electrolysis, is increased from some 50 per cent. of the theoretical quantity to nearly 80 per cent. by the addition of hydrofluoric acid. Platinum electrodes are used, the current density being 0·2 ampere per sq. cm. at the anode and about 1 ampere per sq. cm. at the cathode.

In his experiments with one anode, however, the addition of hydrofluoric acid had no effect, the persulphate crystals clinging to its surface instead of falling to the bottom of the vessel. The reason of this peculiarity was not discovered, although it appeared to be connected with the roughness of the surface; a very smooth surface appears to give the best result. Measurements of the anode potential show that the addition of the hydrofluoric acid causes a sudden and considerable rise in its value; the increased production of persulphate is doubtless intimately connected with this rise.

Molecular Elevation of Boiling Points of Mixtures.—Charles Marie has determined the molecular elevation of the boiling point of mixtures of alcohol and water containing resorcinol, which is soluble in each constituent; or benzophenone, acetophenone, naphthylamine, or phenyl benzoate, which are only soluble in alcohol; or alamine or asparagine, which are only soluble in water; and finds that the experimental values do not agree with the theoretical values calculated from Nernst's formula.

Mixtures of the first type give results which are higher than the theoretical; mixtures of the second type give the same value for the molecular elevation of the boiling point of alcohol and water as for pure alcohol, whilst mixtures of the third type show a depression of the boiling point.

Electrolysis of Solutions of Copper Sulphate.—Fritz Foerster and Giulio Coffetti in the *Zeitung Elektrochemie* give a paper on this subject. Bose has previously observed two cathodic decomposition points in solutions of cupric salts. The authors describe some experiments which show that at cathode potentials below the upper point cuprous oxide is deposited from neutral solutions of copper sulphate, and cuprous sulphate is formed in acid solutions. The phenomena are best observed in hot solutions, because the concentration of the cuprous ions in equilibrium with cupric ions is greater at higher tem-

perature. The observations are best explained by assuming that the reaction $Cu^{\cdot\cdot} - F = Cu^{\cdot}$ takes place at the cathode so long as the solution in contact with it contains less than the quantity of cuprous ions corresponding with the equilibrium $2\,Cu^{\cdot} \rightleftarrows Cu + Cu^{\cdot\cdot}$. Cuprous ions are constantly removed from the neutral solutions by hydrolysis (owing to which cuprous oxide is precipitated), and from acid solutions by oxidation by atmospheric oxygen. At a copper anode, similarly, the copper dissolves in the cuprous condition until equilibrium is attained, and since the layer of solution in contact with the anode always contains more cupric sulphate than the body of the solution, a greater number of cuprous ions will be formed there than can exist in the more dilute mass of the liquid, and therefore as the concentrated solution diffuses away from the anode copper must be deposited. This explains the fact that the loss of weight of the anode is greater than the gain of weight of the cathode, and also the presence of copper dust in the anode slime.

PHYSIOGRAPHY.

(STAGES 2 AND 3.)

SPECTROSCOPY—(*Continued*).

Indices of Refraction.—When a ray of light passes from one substance to another the light is usually bent from its original direction as it enters the second substance. Experiment shows that the amount of this bending depends chiefly upon the substances and upon the angle at which the ray strikes the surface separating the two media. If the ray strikes the surface common to the two substances at right angles, then the ray is not bent from its original course. When the incident ray strikes the common surface at any other angle, we may take it as a general but not infallible rule that if the ray is passing from one medium into a denser one the ray is bent towards the normal to the separating surface, while if it is passing into a less dense medium it is bent away from the normal. This bending of the ray we speak of as refraction.

The ray which comes towards and strikes the separating surface we call the incident ray, and the ray after entering the second substance is called the refracted ray. The point at which the incident ray strikes the surface is called the point of incidence, and a line drawn through this point at right angles

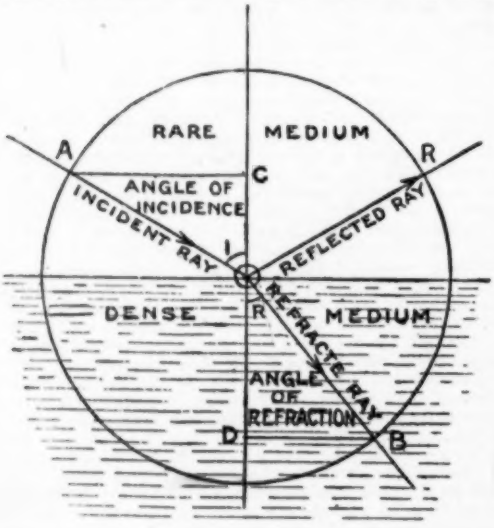


FIG 1.

to the surface is called the normal at the point of incidence. The angle between the incident ray and the normal is called the angle of incidence, and that between the refracted ray and the normal the angle of refraction.

We have already seen that if a beam of white light is refracted by a substance like glass, the beam is broken up into an infinite number of rays of different colours, forming a spectrum. To make our work as simple as possible, we shall assume for the time being that we are dealing with monochromatic light such as sodium light. If a ray of such light, say AO in Fig. 1, falls at an oblique angle on the separating surface, the transmitted light goes along a single line as OB. As the angle of incidence AOC is increased, the angle of refraction DOB also increases. The true relation between these two angles was discovered by Snell, who found that for any two given substances the ratio of the sine of the angle of incidence to the sine of the angle of refraction was constant.

This ratio is termed the relative index of refraction for the two substances, and is generally indicated by the Greek symbol μ, and the law connecting the two angles is known as Snell's law, and may be expressed thus:—

$$\mu = \frac{\sin I}{\sin R}.$$

Referring again to Fig. 1, AOC is the angle of incidence and its sine is $\frac{AC}{AO}$, DOB is the angle of refraction and its sine is $\frac{DB}{BO}$, hence $\mu = \frac{\sin I}{\sin R} = \frac{AC}{AO} \times \frac{BO}{DB}$.

Now since AO and BO are radii of the circle ARB, AO = BO, and these cancel, leaving us with

$$\mu = \frac{AC}{DB}.$$

By means of the spectrometer we can make very accurate determinations of the index of refraction of a transparent sub-

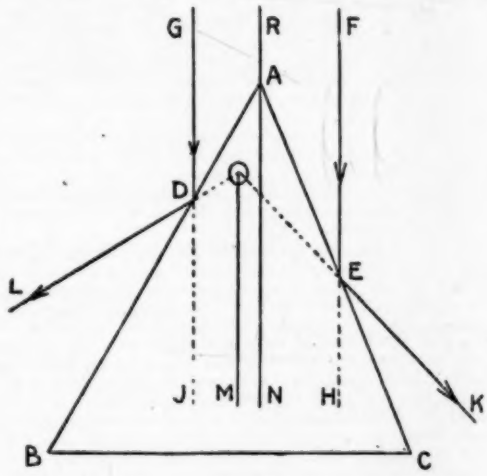


FIG 2.

stance, if the substance can be worked into the form of a prism. (Strictly speaking, what we determine is the relative index of refraction from air into the substance.) We shall now study the method of doing this.

Suppose we wish to determine the index of refraction of one of the glass prisms used for spectrum analysis. We first determine the angle of the prism in the following way. The prism is placed on the table T of the spectrometer (see fig. in last month's issue), with one of its angles turned towards the collimator so that a portion of the light issuing from the collimating lens B falls on one face of the prism and the other portion on the second face. Both portions are reflected. The telescope is turned to receive the beam reflected from one face, and the position of the telescope adjusted until the image of the slit seen by reflection at this face is on the intersection of the cross wires. The reading of the telescope verniers is then taken. The telescope is now turned to receive the beam reflected from the other face, and a similar adjustment and reading taken. The angle moved through by the telescope is twice the angle between the two faces of the prism from which the reflections have taken place. That this is so will be evident from the following considerations:—

In fig. 2 let ABC represent the prism, and GD and FE two rays of the parallel beam coming from the collimator and falling on the two faces of the prism. The ray GD is reflected at the point D, according to the ordinary laws of reflection, so that the angle GDA equals the angle BDL. Produce the line GD to J,

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then the two straight lines AB and GJ intersect each other at D, and the opposite angles GDA and BDJ are equal.

Through A draw the line RAN parallel to GD and FE, then since the straight line BA meets the two parallel straight lines GJ and AN, the angles BDJ and DAN are equal. Hence the four angles DAN, BDJ, BDL, and GDA are all equal. Therefore the angle LDJ is equal to twice the angle BAN. Similarly, the four angles CAN, FEA, KEC, and CEH are equal to each other, and therefore the angle KEH is equal to twice the angle CAN.

Produce KE and LD until they intersect in the point O, and through O draw OM parallel to FH, GJ, and RAN.

Since the straight line LDO meets the two parallel lines GJ and OM, the angle LOM equals the angle LDJ, but the angle LDJ is equal to twice the angle DAN, therefore also the angle LOM is equal to twice the angle DAN. Similarly, the angle KOM equals the angle KEH. But the angle KEH is equal to twice the angle CAN. Hence the sum of the two angles LOM and KOM, that is, the angle LOK, is equal to twice the sum of the two angles BAN and CAN.

But the sum of the two angles BAN and CAN is the angle of the prism BAC, therefore the angle LOK is equal to twice the angle of the prism BAC. Now the angle LOK is the angle through which the telescope is moved to receive in turn the rays reflected from the two faces of the prism. Hence if we divide this angle by two we get the angle of the prism.

(To be Continued.)

THEORETICAL MECHANICS.

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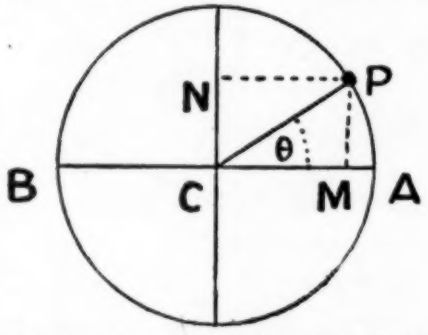
Simple Harmonic Motion.—If a point P move in a circle of radius r with constant speed v, then the projections M and N of P on the horizontal and vertical diameters respectively move with what is termed simple harmonic motion.



The *amplitude* of a simple harmonic motion is the range on one side or the other of the middle point of the path, *i.e.*, C A or C B.

The *period* is the time which elapses until the moving point again moves in the same direction through the same position; *i.e.*, the time taken to move from A to B and back again, or, the time taken by P in making one revolution.

The *displacement* is the distance from mean position: let this distance (C M) be denoted by x.

The acceleration of P is at every instant along the line joining P to the centre of the circle, and its magnitude is $\frac{v^2}{r}$.

The acceleration of M is the resolved part of P, or $\frac{v^2}{r}$ cos MCP $= \frac{v^2}{r}\cos\theta$.

$$\therefore \text{ acceleration of M} = \frac{v^2}{r} \times \frac{x}{r} = \omega^2 x.$$

Hence the acceleration is proportional to x, the distance of the moving point from the middle of its path.

$$\text{Also } \frac{\text{acceleration of M}}{\text{displacement of M}} = \frac{\omega^2 x}{x} = \omega^2 \ldots (1).$$

We thus obtain the important relation that in simple harmonic motion acceleration ÷ displacement = constant.

If n denotes the number of revolutions of P per second, and t the time of one revolution, then $\omega^2 = 2^2 n^2 \pi^2 = \frac{2\pi^2}{t^2} \ldots (2)$.

The Pendulum.—What is called a simple pendulum is an ideal conception: a good approximation, and sufficiently accurate for all practical purposes, consists of a fine string, or thread, fixed at one end and carrying a small ball (or bullet) P at the other.

The position of rest is the vertical line OA; when displaced through a small angle and let go it will swing to and fro. On account of resistances the amplitude of the swing will diminish, but the time of each swing remains practically unaltered.

When the ball is at one end of its swing, and for the instant at rest, there is a certain store of potential or position energy; this potential gradually changes to kinetic as P moves towards OA, until when passing A the energy is for the instant wholly kinetic and the ball is moving at its greatest speed. As the swing continues the speed diminishes, until at the highest point the ball is instantaneously at rest and the process is repeated.

Let m denote the mass of the ball, the component of mg along the string, or, the tension in the string, is $mg\cos\alpha$; the component perpendicular to the string, producing the acceleration of P, is $mg\sin\alpha$:

$$\therefore f = \frac{mg\sin\alpha}{m} = g\sin\alpha.$$

If l denotes the length of the string OP, the displacement from mid-position is the arc AP $= l\alpha$.

$$\text{Hence } \frac{\text{acceleration}}{\text{displacement}} = \frac{g\sin\alpha}{l\alpha}.$$

Now when α is small the sine of an angle is very nearly equal to its radian measure,

$$\therefore \sin\alpha = \alpha,$$

$$\text{or } \frac{g\sin\alpha}{l\alpha} = \frac{g}{l} = \omega^2 = \frac{2^2\pi^2}{t^2} \text{ from (2).}$$

$$\therefore t = 2\pi\sqrt{\frac{l}{g}} \ldots (3).$$

Eq. (3) gives the periodic time or time of a double swing, the time of a single swing or vibration is given by

$$t = \pi\sqrt{\frac{l}{g}} \ldots (4).$$

It will be noticed that when l and t are known the value of g can be determined.

Ex. 1. Calculate the length of a pendulum to beat time to 100 paces a minute; and the speed of march in miles per hour with a pace of 30 inches. (Inter. Sci. 1903.)

$$100 \text{ paces per minute} = \frac{100}{60} \text{ paces per second}$$

$$\text{periodic time of vibration} = \frac{60}{100} = \frac{6}{10}.$$

Let l denote the length of pendulum, then from the relation $t = \pi\sqrt{\frac{l}{g}}$ we obtain $\frac{6}{10} = \pi\sqrt{\frac{l}{g}}$.

$$\therefore l = \frac{36 \times g}{100 \times \pi^2} = 1{\cdot}167 \text{ feet.}$$

$$\text{Distance in feet per hour} = \frac{100 \times 30 \times 60}{12}$$

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Ex. 2. Calculate the length in inches of a second pendulum where $g = 32{\cdot}2$. (B.A., 1900.)

From Eq. (4) we have $t^2 = \pi^2 \times \frac{l}{g}$

$$\therefore l = \frac{gt^2}{\pi^2} = \frac{32{\cdot}2 \times 12}{\pi^2} = 39{\cdot}14 \text{ inches.}$$

Ex. 3. A pendulum is observed to lose 20 seconds a day when taken to a different locality after all corrections for temperature, &c., have been made. Find approximately the difference between the intensities of gravity in the two places. (Inter. Sci., 1900.)

Let t_1 be the periodic time in the first locality and t_2 the time in the second, then as l the length of the pendulum remains the same we have

$$t_1 = 2\pi\sqrt{\frac{l}{g_1}} \text{ also } t_2 = 2\pi\sqrt{\frac{l}{g_2}}$$

$$\therefore \left(\frac{t_1}{t_2}\right)^2 = \frac{g_2}{g_1} \quad \ldots \quad (1).$$

As the pendulum loses 24 seconds in $24 \times 60 \times 60$ seconds we obtain by substitution in (1)

$$\left(\frac{24 \times 60 \times 60}{24 \times 60 \times 60 - 20}\right)^2 = \frac{g_2}{g_1}$$

$$\therefore \left(\frac{4320}{4320 - 1}\right)^2 = \frac{g_2}{g_1}$$

$$\text{Now } \left(\frac{4320}{4320 - 1}\right)^2 = \left(1 - \frac{1}{4320}\right)^2 = 1 - \frac{2}{4320} \text{ approx.}$$

$$\therefore \frac{4318}{4320} = \frac{2159}{2160} = \frac{g_2}{g_1}.$$

Hence the difference between the intensities of gravity at the two places is given by $g_2 : g_1 = 2159 : 2160$.

Ex. 4. Define simple harmonic motion; prove that the acceleration is proportional to the distance from the mid-point of the motion. (Inter., 1900.)

Ex. 5. Prove that the time of a simple pendulum is undistinguishable from $\pi\sqrt{(l/g)}$ seconds when the amplitude of oscillation is small. (Inter., 1902.)

Ex. 6. By how much is a seconds pendulum too long if it loses a minute a day? (Ans. 0·045 inch.) (B.A., 1900.)

QUERIES.

Caliga.—Tangents are drawn to a hyperbola from a point on the conjugate hyperbola: prove that the chord of contact touches the conjugate hyperbola. (B.Sc. London, 1903.)

Let $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be the equation of the hyperbola, and $-\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ the equation of the conjugate hyperbola.

Let (x_1, y_1) be any point on the conjugate hyperbola; then the chord of contact of tangents drawn from (x_1, y_1) to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is given by the equation

$$b^2x_1x - a^2y_1y = a^2b^2 \quad \ldots \quad \text{(i.)}$$

Now (i.) will touch the conjugate hyperbola if, on eliminating (y) between (i.) and the equation $-b^2x^2 + a^2y^2 = a^2b^2$, the resulting equation in (x) has equal roots.

From (i.) we have $y = \frac{b^2}{a^2}\frac{x_1x - a^2}{y_1}$. On substituting this value of y in $-b^2x^2 + a^2y^2 = a^2b^2$, we obtain the equation

$$(a^2y_1^2 - b^2x_1^2)x^2 - 2a^2b^2x_1x + a^4(b^2 - y_1^2) = 0 \quad \ldots \quad \text{(ii.)}$$

But (x_1, y_1) is a point on the conjugate hyperbola, $-b^2x^2 + a^2y^2 = a^2b^2$. Therefore (ii.) may be written in the form $a^2b^2x^2 + 2a^2b^2x_1x + a^4(b^2 - y_1^2) = 0$, and this reduces to

$$b^2x^2 + 2b^2x_1x + a^2(b^2 - y_1^2) = 0 \quad \ldots \quad \text{(iii.)}$$

Now the equation (iii.) has equal roots if

$$-b^4x_1^2 = a^2b^2(b^2 - y_1^2)$$

that is, if $-b^2x_1^2 + a^2y_1^2 = a^2b^2$; and this is the case since by hypothesis (x_1, y_1) is a point on the curve $-b^2x^2 + a^2y^2 = a^2b^2$.

Hence the chord of contact,

$$b^2x_1x - a^2y_1y = a^2b^2,$$

of tangents drawn to the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1,$$

from (x_1, y_1), any point on the conjugate hyperbola,

$$-\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1,$$

touches the conjugate hyperbola.

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THE Marquis of Londonderry, President of the Board of Education, has appointed the Hon. Maude Lawrence to a newly-established post of Chief Woman Inspector under the Board of Education. Miss Lawrence is the youngest daughter of the first Lord Lawrence, Governor-General of India, who was Chairman of the first School Board for London. She was for many years Chairman of a Committee of Managers under the London School Board, and was a member of the London School Board from 1899 to 1904, serving on the Committees for School Management, for Works, for Domestic Subjects, and for School Accommodation, and being Chairman of the Special Schools Sub-Committee. In May 1904 she was placed by the London County Council upon their Education Committee, and she is Vice-Chairman of their Special Schools Sub-Committee, and a member of two other Sub-Committees.

Miss Lawrence will direct a staff of Women Inspectors of special qualifications and varied experience, who will assist the Board in dealing with many questions for the treatment of which they have hitherto been somewhat imperfectly equipped.

Among these may be indicated the education of very young children, the special education of girls and young women in Public Elementary Schools, Secondary Schools, Pupil Teacher Centres, Evening Schools, Training Colleges, and Evening and other Technical Classes, and the suitability of the arrangements made for the boarding of women students in Training Colleges and Hostels.

Instruction in various domestic subjects, such as Needlework, Cookery, Laundry Work, Household Management, and Hygiene, has for some time past been given under the Regulations of the Board for Schools of different grades. But the Report of the Inter-Departmental Committee on Physical Deterioration points to the need of a reform in the methods now commonly employed in the teaching of these subjects. It is considered that this instruction has been less effective than it should have been, because it has been too theoretical, and has not been kept sufficiently in touch with the needs and habits of daily life. The Board will employ the new branch of the Inspectorate to assist Local Authorities in providing, as part of their educational system, ample opportunities for girls of various ages to obtain a training for home life simple, practical, and adapted where necessary to the special circumstances of each locality.

There are also many questions of importance involving the national physique, as affected by the studies, the life, and the treatment of children, and especially of very young children, from day to day in Elementary Schools, which Women Inspectors are specially qualified to investigate and to advise upon. The Board feel that it is of great importance to direct the attention of Local Authorities to these matters, and that this service will be most efficiently rendered by a competent staff of Women Inspectors.

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> "Self-reverence, self-knowledge, self-control—
> These three alone lead life to sovereign power."

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Hermann Sudermann, Poête Dramatique et Romancier. Par Henri Schoen. M. Schoen's work on the leader of the realist school of German literature well maintains the reputation which France has deservedly gained for literary criticism. In an illuminating introduction M. Schoen traces the rise of the realistic school in Germany. Imitation of the foreigner has in Germany always preceded the growth of a new literary movement, and so we find German students enthusiastic admirers of the Russian, Norwegian, and French realistic writers long before realism obtained a footing in German literature itself. Dostoijeffsky's powerful and epoch-making work, *Crime and Punishment*, found its earliest admirers in Germany. Tolstoi, Ibsen, Zola, Maupassant, and Bourget helped to spread the new movement and to prepare the way for native writers who should forsake the paths of convention and deal with the facts and the problems of life in these latter days. To these influences the war of 1870, by founding a united Germany under the hegemony of Prussia, contributed. In matters of art and literature the provincial capitals, with their coteries and party spirit, lost their importance, and Berlin became recognised as the literary as well as the political centre of the new Empire. It was under such auspices as these that Gerhardt Hauptmann and Hermann Sudermann founded a school of German realism, not without encountering the most violent and determined opposition of those who saw in the new movement grave political, social, and moral dangers. Perhaps in Sudermann's early works, which are strongly marked by French influences, there was some ground for these fears, but as he developed he gave to the world such works as *Frau Sorge*, *Die Ehre*, and *Heimat*—works founded on modes of German thought and feeling. M. Schoen, in his frank and impartial criticism of Sudermann's methods and works, gives him full credit for his bold attacks on the social and moral evils which have followed on the increase of wealth in Germany, as well for his denunciation of the *Standesehre*, that relic of mediævalism which is still so powerful in aristocratic Prussia. We strongly recom-

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The introduction, by Dr. Roberts, is very sensible and well written.

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La Grand Route du Tchad: Mission de la Société de Géographie. Par Commandant Lenfant. Préface par M. Le Myre de Vilers, Président de la Société de Géographie. Introduction de Maurice Albert, Répétiteur à l'École Polytechnique. English readers have not yet forgotten the successful attempt of Commandant Lenfant to reach Lake Chad by water from the Niger basin, and the rapidity with which this piece of pioneering was accomplished. The story is too long to summarise here, and belongs to the realm of geographical science rather than of adventure, though adventure is not absent from the tale. The book is a valuable one for its records of geographical fact, meteorology, and first-hand observations of the people. It is well and clearly written, while the publishers have done their share with the perfection which stamps all their work. There are numerous photographs, of very great interest, and a large folding map of the Commandant's route. In its large format and handsome binding, the book appeals by its form and its matter alike to those of varied interests, and will enjoy a wide popularity.

La Pupille du Bonhomme. Par Pierre Maël. Ouvrage illustré de 66 gravures sur bois par H. Vogel. The recent death of the popular French writer, who was known by his pen-name of "Pierre Maël," gives a sad interest to this story, which is in itself one of the most interesting that we have read The real hero of the tale is *Le Bonhomme* himself, as La Fontaine was called by his friends, many of whom, including Molière and other contemporary writers, figure in these pages. Round part of the literary career of La Fontaine a simple tale of French life is woven, and what gives a special literary piquancy to the work is that each scene or chapter of the story is presented as affording the material for one of his immortal fables. The character painting is clear and lucid, and the incidents are well chosen for the purpose of the writer. The book is issued in the gorgeous livery of the French prize book, which to our mind risks concealing the fact that it is worthy of a place among those simple paper-covered volumes which contain most of our modern French literature. Though apparently designed for young people, its merits should ensure for the work a hearty reception by those of a more serious age.

Chansons du Vieux Temps. Recueillies par Julien Tiérsot. Illustrations de Gerbault. Ten genuine old folk-songs, simple peasant ditties, not overcharged with meaning, but racy of the soil, are here presented in a singularly attractive form. The volume provides a feast for the eye as well as the ear, and the dainty quaint coloured illustrations which are profusely sprinkled over every page would make the book a welcome gift even to the deaf or the dumb. Rarely have we come across one where the sister arts of music and painting are more happily combined. It should find a welcome in the nursery of every home where French is spoken or understood.

Princesse Rosette. By Madame la Comtesse de Ségur. This fascinating little fairy tale has been published with Notes and Vocabulary, and will form a suitable reader for the lower forms.

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Exercises in German Conversation and Composition. By E. C. Wesselhoeft, M.A. This little book belongs to Heath's "Modern Language Series," and consists of a collection of anecdotes each of which is made the basis of a conversation and of an exercise in translation into German. The stories are well selected, and the exercises capitally drawn up. There are ten pages of introduction, dealing in a helpful way with such pitfalls as the order of words and the separable particles.

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out speaks of that actual experience which is essential to the production of a book on education of any real value. This work is "primarily intended" for "the younger members" of the teaching profession, but its usefulness will, we hope, extend beyond that limit.

In Part I. the writer treats of introductory matters—the meaning of education, and the relation between theory and practice. Here he is very sound. "The 'day-dreams of a schoolmaster,'" he says, "may indeed be sometimes fruitful of results; but on the whole it is certainly undesirable that he should be occupied in the hours of school with thoughts of the ultimate meaning and issue of his labours. He should rather trust, when among his pupils, to the afterglow of his periods of private illumination." After considering "The Machinery of Education," he proceeds in Part III. to discuss "The Subject of Education"—that is, the child. This is a new feature in educational works. To recognise that the child is an important subject of study by teachers is almost an act of daring. Yet it is here and there being ventured by modern writers, and we may predict that the time is rapidly approaching when the absence of such a section in an educational work will stamp it at once as hopelessly inadequate. After all Professor Raymont seems a little uncertain and half-hearted in recommending the practical study of children to his readers. His remarks assume too much the appearance of warning teachers against child study rather than recommending it to them. What knowledge of children can be "irrelevant" to those whose work is the training of children? If "width of range" and "verification" are desiderated, as they must be, the clear path is to make more experiments in the proper way, not merely to reject the conclusions arrived at by earlier investigators. Our author's practice is better than this, however, as he proceeds to give a short account of what is established regarding the stages of development of children, a feature of the book which should do much to commend it. Once more, in his discussion of the Curriculum, in Part IV., we have to note his sane and practical outlook, combined with knowledge of recent movements of thought. Without going more fully into detail, we may describe the whole work as one of the best practical treatises which we have seen. We use the word *practical* of set purpose, for we think that it is essentially an exposition of practice; or, taking the title of the book as authoritative, we regard it as literally a discussion of the sound principles underlying each phase of educational practice, but we do not feel that these principles follow inevitably from any one fundamental principle. We quite agree with the writer as to the fact of "the dependence of education upon psychology," but we cannot rest with principles drawn from "some half a dozen other sciences." The unifying principle which shall bind these into one is not clear; the several subordinate principles and their applications are admirably set forth.

A Short Introduction to the Theory of Electrolytic Dissociation. By J. C. Gregory, B.Sc. (Lond.), A.I.C. This little manual well fulfils the aim indicated in its title. While brief and concise it is admirably clear, and the free use of diagrams and equations, combined with simplicity and lucidity of style, make it a model of a short scientific monograph.

The Teaching of Biology. Lloyd and Bigelow. American Teachers' Series, 491 pp. 6s. net. This excellent volume is an apologia for systematic Nature-teaching, on lines already familiar in this country by the propaganda of such first-rank men as Huxley, Spencer, Gosse, Kingsley, Gairdner and others. Surely, if any defence at all is needed for these objective studies in opposition to the somewhat musty "humanities," it will be found in these closely reasoned pages. The book is in two parts, the teaching of Botany and the teaching of Zoology, including Human Physiology; each part has its own author, and there is consequently a tendency towards repetition of the apologetic and polemical portions. A gratifying feature of the book is the copious bibliography which heads each chapter, giving the teacher in training a veritable quarry from which to draw his information at first hand, or to supplement the materials supplied in the text. Typical courses of Botany are discussed; the herbalist method, aiming at personal knowledge of plants by a head-mark or their ready identification by a flora; the type course, proceeding either from the simpler to the more complex forms, or, after the example of Huxley, from the complex but familiar form to those less known. Thirdly, there is the association course, of the fern-earthworm type, and lastly, the synthetic style of treatment. Fully sixty pages are devoted to the details of a high school or normal college course on the synthetic principle, and this section closes with a really fine chapter devoted to laboratory practice, hints on fittings, cutting, staining, mounting, preservation of specimens, and the like, with a very useful classified list of books for first-hand reference and continuation reading.

The second portion of the book treats of Zoology on similar lines, and here, as in the other, a very full practical course is given in great detail, the vertebrates receiving a more than usually generous share of the scheme. The course is intended for a session of not less than thirty-six weeks, giving five hours a week, and it is thus seen to be suitable only for high schools and training colleges. As in the botanical section, very useful practical hints are given in all manner of zoological practice, and a very full classified or qualitative list of books is appended for the student's further use. The compulsory teaching of temperance in the schools of the United States calls for a scientific discussion of the *morale* and methods of such teaching. The function of this work may be best summarised in the words of the general editor: "The 'American Teachers' Series' . . . are designed to be contributions to the professional knowledge necessary in secondary education, and are addressed to teachers of liberal culture and special scholarship who are seeking to make their knowledge more useful to their pupils and their pupils more useful to the State."

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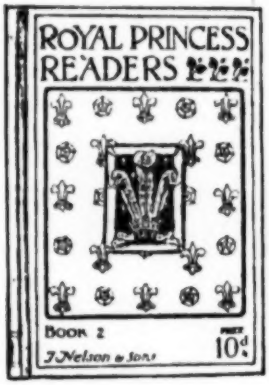

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